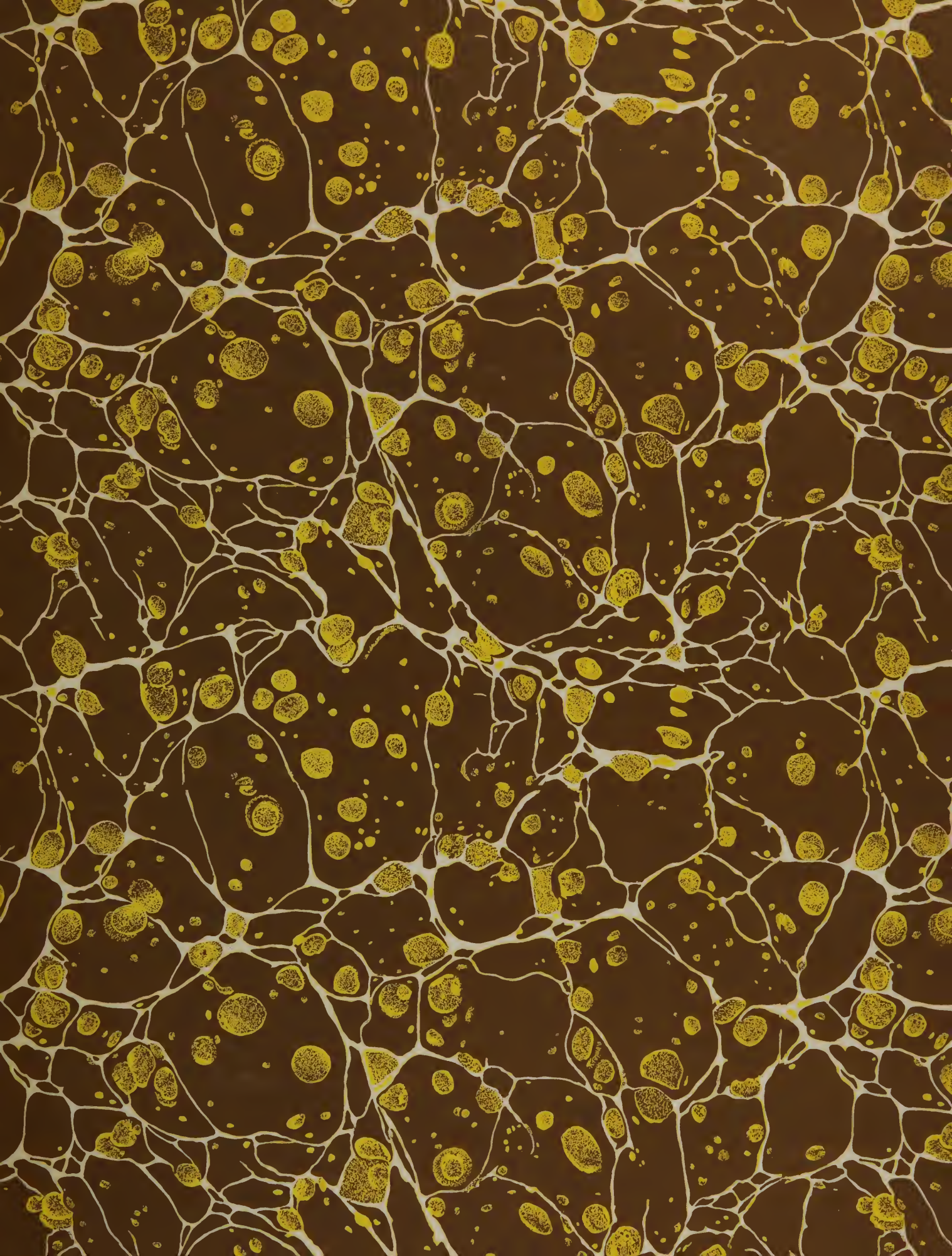


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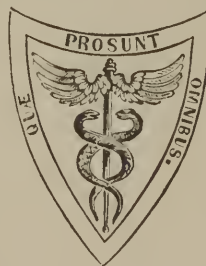


THE
PRINCIPLES AND PRACTICE
OF
OBSTETRICS.

ILLUSTRATED WITH
One Hundred and Fifty-nine Lithographic Figures from Original Photographs,
AND WITH NUMEROUS WOOD-CUTS.

BY
HUGH L. HODGE, M.D.,

EMERITUS PROFESSOR OF OBSTETRICS AND DISEASES OF WOMEN AND CHILDREN IN THE UNIVERSITY
OF PENNSYLVANIA; LATELY ONE OF THE PHYSICIANS TO THE LYING-IN DEPARTMENT OF THE
PENNSYLVANIA HOSPITAL; LATELY ONE OF THE PHYSICIANS TO THE PHILADELPHIA
ALMSHOUSE HOSPITAL; CONSULTING PHYSICIAN TO THE PHILADELPHIA
DISPENSARY; FELLOW OF THE COLLEGE OF PHYSICIANS
OF PHILADELPHIA; MEMBER OF THE AMERICAN
PHILOSOPHICAL SOCIETY, ETC.; AUTHOR OF
A TREATISE ON "THE PECULIAR
DISEASES OF WOMEN."



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TO THE
MEMORY
OF
THOMAS C. JAMES, M.D.,
THE FIRST PROFESSOR OF OBSTETRICS IN THE UNIVERSITY OF PENNSYLVANIA,
AND OF
WILLIAM P. DEWEES, M.D.,
HIS COLLEAGUE AND SUCCESSOR,
BY
WHOSE TALENTS AND ATTAINMENTS,
MORAL EXCELLENCIES, SOCIAL INFLUENCES,
PUBLIC TEACHINGS AND CLASSICAL WRITINGS,
THE FOUNDATION OF THE SCIENCE OF OBSTETRICS WAS LAID IN AMERICA,
THIS WORK
IS MOST RESPECTFULLY AND GRATEFULLY
INSCRIBED
BY
THEIR PUPIL AND FRIEND,
THE AUTHOR.

P R E F A C E.

THE science of obstetrics is of modern origin. The practice of midwifery has been, in all ages, chiefly in the hands of females. The reason is obvious, and whatever may be the disadvantages of this practice, the parturient woman must necessarily be mainly dependent upon the assistance of her own sex in her hour of suffering, until civilization and science have been extended throughout the world. As medicine and surgery became more influential, midwives, in cases of emergency, were compelled to seek the assistance of physicians and surgeons. Thus, operative midwifery was eventually regarded as a part of surgery, and no line of distinction appears to have been drawn between the surgeon and the accoucheur, prior, at least, to the end of the seventeenth century. At this time Mauriceau appeared in Paris, and devoted himself so exclusively to the study and practice of obstetrics, that he has been termed "the first real obstetrician;" although Ambrose Paré, a century previous, had a great reputation, not merely as a surgeon, but also as an accoucheur. The profession and the public are much indebted to him for substituting podalic version for embryotomy in many cases of difficult labor.

It was not, however, until the middle of the eighteenth century that obstetrics was divorced from its intimate connection with surgery, and also disencumbered from the trammels of ignorance, superstition, and empiricism, which had so greatly retarded its progress. This important change was effected chiefly by the labors of Dr. Smellie, in England, and of M. Levret, in France. These gentlemen had the talent and sagacity to profit by the labors and discoveries of their predecessors, and, by diligent observation and study, so to improve their knowledge as to give the character of a science to the art of obstetrics. They ably illustrated the process of natural labor, and also the difficulties with which it was often complicated; and, at the same time, they gave excellent directions for the management of parturition. They both greatly improved the forceps, which had been previously invented by the Chamberlens, who, unfortunately for their reputation, kept this great discovery, for a long time, a secret in their own family. The first public enunciation of it was made by Chapman, in 1733. The oral and written teachings of Smellie and Levret had an immediate and marked influence, so that practitioners and teachers of this branch of medicine rapidly multiplied in France and England, and thence in other portions of Europe.

Notwithstanding the influence thus exerted by these great men and their successors, such as Baudelocque, in France, and Denman, in England, the progress of obstetrics has been retarded by ignorance and prejudice. Women, more or less educated, have been and still are much employed; but every day the advantage of having well-instructed and scientific men to superintend the pro-

cess of parturition is becoming more apparent, and obstetrics is now universally recognized as a co-ordinate branch of the science of medicine. This acknowledgment has been slowly made, even by members of the profession. We find that, as late as 1826, Dr. Ramsbotham, junior, and some thirty teachers and practitioners of obstetrics, had to unite their exertions, for a series of years, in London, to obtain fellowship with the College of Physicians, and the declaration that a knowledge of obstetrics should be rendered obligatory upon all candidates for medical honors.

At the commencement of the last century, obstetrics in the United States was regarded altogether as a subordinate branch of medicine; its practice was entrusted to women, and it was only in cases of tedious and dangerous labors that the assistance of the surgeon was required. Nevertheless, in our large cities at least, there were many practitioners so well indoctrinated in the principles of obstetrics, as then understood, that they could afford important aid to the parturient woman. There were, however, many young Americans of talent, whose love of knowledge induced them to visit European schools, that they might be prepared to practice their profession at home. Some of these devoted special attention to midwifery. We may mention, in this connection, Dr. James Lloyd, a graduate of Harvard University, who attended the lectures of Dr. Smellie, of London, receiving from this distinguished teacher a testimonial of his industry and proficiency, and, after his return home to Boston, in 1752, devoted himself, most successfully and acceptably, to the practice of obstetrics for many years. He died in 1810, aged eighty-two years. Dr. Thomas Bond, and his brother, Dr. Phineas Bond, were born in Maryland, and completed their medical education in European schools, chiefly at Paris. They settled in Philadelphia, where they practiced their profession for many years, and were associated with the founders of our medical schools and hospitals. Dr. Gustavus R. Brown, of Charles County, Maryland, was educated at Edinburgh, and graduated in 1768. His nephews, Drs. Gustavus and William Brown, and also Dr. Parham, of Maryland, all received their medical education in Europe. Dr. Walter Jones, of Northumberland County, Virginia, graduated in 1770, at Edinburgh, and, on his return, obtained a great reputation for talent and attainments. In South Carolina, Dr. William Bull, son of the Lieutenant-Governor of that province, visited Holland, to attend the lectures of Boerhaave, and became the fellow-student of Van Swieten, who speaks of him as the "learned Dr. Bull."

Of all the young Americans, there were none more distinguished, or whose labors had a more important influence upon the progress of medical science, than Dr. William Shippen, junior, and Dr. John Morgan, both of Philadelphia, who became the founders of the Medical College of Philadelphia, now the University of Pennsylvania. Dr. Shippen was the son of Dr. William Shippen, senior, and was born in 1736. He studied anatomy and surgery in England under the superintendence of Mr. John Hunter, and midwifery under the direction of Dr. William Hunter, and also of Dr. McKenzie, then an influential practitioner of midwifery in London. He returned to Philadelphia in the spring of 1762, and in the fall of the same year commenced a course of lectures upon anatomy, surgery, and midwifery, and thus laid the foundation of the first regular course of medical instruction in the United States. Dr. John Morgan was a contemporary of Dr. Shippen, and also a disciple of Dr. William Hunter, but completed his medical education at the College of Edinburgh. After travelling extensively in Europe, and becoming acquainted with many of the distinguished men of that age, including the celebrated Morgagni, of Italy, he returned home in 1765. In accordance with a previous agreement, he and Dr. Shippen presented a plan to the Philadelphia College, of adding a medical department to that institution. The trustees readily acceded to this proposition, and appointed Dr. Morgan, Professor of the Theory and Practice of Medicine, and Dr. Shippen, Professor of Anatomy, Surgery, and Midwifery. Their first united course of lectures was

delivered in the winter of 1765-6, and on the 21st of June, 1768, they had the gratification of witnessing ten of their pupils receive the "first medical honors" conferred in America.

In New York, five years after Dr. Shippen commenced his course of lectures in Philadelphia, a medical faculty was added to King's (now Columbia) College. Dr. Samuel Bard, a Philadelphian, and the son of Dr. John Bard, was educated in New York. He afterwards went to London, and attended the lectures of Dr. William Hunter. He completed his course of instruction and received his medical diploma at the University of Edinburgh. On his return home, in 1767, he was honored with the appointment of Professor of the Theory and Practice of Medicine in King's College, in the foundation of which he had been chiefly instrumental, although not yet twenty-eight years of age. In the list of his colleagues, as Professor of Obstetrics, we find the name of Dr. John V. B. Tennant, originally from New Jersey.

The study of the medical sciences, thus inaugurated in America, in two of its most important cities, was completely interrupted by the Revolutionary war. At the end of this conflict, medical instruction was resumed in Philadelphia. About the same time Harvard University, at Cambridge, Massachusetts, which had been founded in 1638, instituted a Medical Department, with three professorships. Dr. John Warren, who had for three years been a private lecturer upon anatomy and surgery, was appointed professor of these branches in 1783. In the arrangement of the duties of the professors, it does not appear that midwifery received any special attention, and this omission seems to have continued until 1815, when Dr. Walter Channing was appointed Lecturer upon Obstetrics and Medical Jurisprudence. For a series of years this gentleman greatly contributed, by his personal and professional character, to elevate the science of Obstetrics in public opinion. He was among the first, in this country, to authorize the employment of anæsthesia during labor.

In New York, after the Revolution, owing to many fortuitous circumstances, there was no regular school re-established until 1792, when Columbia College elected a medical faculty; the labors of which proving not very efficient, the Regents of the University of New York granted, in 1807, a charter to an institution designated as the College of Physicians and Surgeons of New York. In 1813, a union was effected between this school and that of Columbia College. In this new faculty we find that Dr. John W. Francis was the Professor of Obstetrics. Another change occurred, owing to the resignation of the existing faculty, and the appointment, in 1826, of new professors, the Chair of Obstetrics being now assigned to Dr. Edward Delafield.

Almost contemporaneously with these efforts in the City of New York was the establishment of medical schools in different portions of New England and New York State. Dartmouth College, at Hanover, New Hampshire, was organized in 1810; the College of Physicians and Surgeons of the "Western District of New York" in 1812; a Medical Department to Yale College was added in 1813; the Vermont Academy at Burlington in 1818; the Medical School of Maine in 1820; the Medical Department of Brown University, Rhode Island, in 1821; and the Berkshire Medical School, at Pittsfield, Massachusetts, in 1822. At the South and West, the Medical Department of the University of Maryland was established in 1807; the Ohio College, at Cincinnati, in 1818; the Transylvania University, at Lexington, Kentucky, in 1819; and the Medical College of South Carolina, in 1824.

Medical schools have since multiplied in every part of the United States, and in all of them obstetrics have been taught, frequently by a separate professor, although, in many instances, this branch was connected with some other professorship. Prior to the commencement of the present century, instruction in midwifery was exceedingly superficial. A few general directions and simple

demonstrations on some of the more important points constituted the teachings which were given to medical students, by gentlemen whose time and talents were chiefly occupied with the subjects of anatomy and surgery. In Philadelphia, the credit of first attempting a more enlarged course of instruction must, perhaps, be given to Dr. William P. Dewees, who, in 1797, gave a course of private lectures to a few pupils. A more regular, systematic course was, however, commenced in November, 1802, by Thomas C. James, M.D., in connection with the late Dr. Church; two courses were delivered each year. After the death of Dr. Church, Dr. N. Chapman became associated, in 1807, with Dr. James, and, by his talents and social qualities, augmented the number of pupils. On the death of Professor Slippen, in 1808, Dr. Wistar was appointed Professor of Anatomy and Midwifery in the University of Pennsylvania. Soon after his appointment, Dr. W. being persuaded of the necessity that the science of obstetrics should be fully taught, presented his views to the Trustees in an elaborate letter, dated January, 1809, urging that a distinct professorship should be established for this important branch of practical medicine. This suggestion was carried out in 1810, and Dr. Thomas C. James was elected Professor of Obstetrics and of the Diseases of Women and Children, in the University of Pennsylvania. In the discharge of his new duties he was still assisted by Dr. Chapman. Unfortunately, the Trustees did not render the course of obstetrics obligatory on the candidates for graduation. This omission was not rectified until October, 1813, when the following resolution was passed by the Board of Trustees: "Resolved, That hereafter the Professor of Midwifery shall be a member of the medical faculty, and shall have all the powers, authority, and privileges belonging to a Professorship in the said faculty; and that no person shall be admitted hereafter as a candidate for the degree of Doctor of Medicine in this University, unless he shall have regularly attended the lectures of the said professor for two years; provided," etc. By this act of the Trustees, the science of obstetrics was declared to be co-ordinate with other branches of the profession, and its practitioners were placed upon an equality with physicians and surgeons, as to rights and privileges. The importance and practical value of this event have since been universally acknowledged; and there can be no doubt that the science of obstetrics demands as much talent, knowledge, and experience, to comprehend its principles, and to render such principles efficient for the relief of human suffering, as any other branch of the profession.

Dr. James, to whom the honor thus belongs of commencing the first regular course of obstetrics in the United States, and of continuing that course, first as a private teacher, and afterward as a public professor for a period of thirty-two years, was born in Philadelphia, August 31st, 1766, and was the youngest son of Abel James, merchant, a member of the Society of Friends. Having received an excellent private education, he became a pupil of Dr. Adam Kuhn, and graduated at the University of Pennsylvania, in 1787. After several delays, he finally succeeded in his long-cherished wish of completing his medical studies in Europe; he arrived in London in 1790. The following spring he became an inmate of the Story Street Lying-in Hospital, and received, from the instruction of Drs. Osborne and John Clarke, those principles of the science of obstetrics, which, in future years, regulated his own practice and teachings. He also attended lectures at St. George's Hospital, and afterward, in the winter of 1792-3, at the University of Edinburgh. He commenced his professional course in Philadelphia, in the fall of 1793, under the most favorable auspices. His great mental power, his literary and scientific attainments, his social connections, and the excellence and purity of his character, all combined to favor his professional success, and gradually to elevate him to positions of influence and usefulness enjoyed by few of his contemporaries. His practice was very extensive, and his lectures, which were highly instructive and ornate, evinced

the extent of his erudition, and proved to be very acceptable to the continually increasing classes of the University of Pennsylvania. In 1825, his health beginning to fail, Dr. William P. Dewees was, at his request, appointed his colleague. In the spring of 1834, his feebleness had so greatly increased, that he resigned his professorship, and thus closed a professional career of forty-one years. The influence of this great and good man was, in various ways, exceedingly important; but in none so valuable as in elevating obstetrics to its proper status, and in advancing it by the purity of his life and character.

The progress of obstetrics in America has also been facilitated through the medium of the press. Many valuable contributions were published in the English journals by American obstetricians, during the last century; but, since 1800, the press of our own country has received many communications, exhibiting careful observation and much reflection.

Practitioners in midwifery, nevertheless, depended entirely upon European systematic writers. Copies of their works could not, however, be easily procured, and hence the diffusion of obstetric knowledge was very imperfect. To remedy this deficiency, Dr. Dewees exerted his influence to have Heath's translation of Baudelocque republished in the United States, in the year 1807, and thus conferred a great public benefit, by presenting to the American profession the opinions of that eminent practitioner and teacher. In 1810 Dr. Chapman conferred a similar benefit by republishing the excellent work of Dr. Burns, of Glasgow, Scotland, with notes. This work became the text-book of Dr. James, by whom it was several times republished, with valuable additions from his own pen. In 1816, "A Synopsis of the Various Kinds of Difficult Parturition," by Dr. Samuel Merriman, was republished in this city, at the suggestion of Dr. James, who enhanced its value by notes. Dr. J. W. Francis, Professor of Obstetrics, in New York, republished, in 1821, Dr. Denman's work on Midwifery, so long regarded as of standard authority in Great Britain. Dr. F. prefaced the publication by a valuable introduction, and added many observations of his own. Ten years afterward, Dr. Meigs favored the public with an excellent translation of Velpeau's Midwifery, a work of the highest authority, especially as representing the state of obstetric science in France during the first quarter of the present century. Other valuable republications have since been made, and extensively circulated, so that every practitioner has been furnished, at a moderate price, with the best European works. A translation of Maygrier, by Dr. Doane; Rigby's Midwifery, edited by Dr. Hays; Blundell's Midwifery; Churchill's Obstetrics, edited by Dr. Huston, and subsequently by Dr. Condie; Lee's Midwifery; a translation of Chailly's work, by Dr. Bedford; a translation of Cazeaux's Midwifery, first by Dr. R. P. Thomas, in 1850, and afterward by Dr. W. R. Bullock, in 1857; the Obstetric Contributions of Dr. Simpson, edited by Dr. Storer, of Boston; Ramsbotham's Midwifery, edited by Dr. Keating; and Dr. Tyler Smith's treatise, edited by Dr. A. K. Gardner, of New York;—these, in addition to the innumerable republications of cases, monographs, as well as condensed summaries, abundantly evince the professional interest which has been excited in regard to obstetric science, and to what extent its principles and practice, as inculcated by the best teachers in Europe, have been diffused through our country.

In addition, much has been done by our own writers. Our medical journals have multiplied with wonderful rapidity since 1797, when the New York Medical Repository made its appearance as the first American medical periodical. These all contain original cases and observations on midwifery and occasionally valuable suggestions and essays.

To Dr. Samuel Bard, of New York, belongs the credit of preparing the first treatise on Midwifery in America. This modest, but excellent compendium, appeared in 1808, and was intended chiefly for the instruction of midwives, who, in this country, were deplorably ignorant.

In 1817, on issuing his fourth edition, he enlarged the work, and adapted it to the use of students. Dr. William P. Dewees, in 1825, published his *System of Midwifery*, a work so scientific, and so original in its doctrines and practice, as at once to give its writer classic authority in America and Europe. His opinions and practice have exerted a predominant influence on the professional mind, and have given a tone as well as an impetus to the science of obstetrics in the United States.

Dr. Dewees was a native of Pennsylvania, and was born at Pottsgrove, (now Pottstown,) on the 5th of May, 1768. He had not the advantages of a collegiate education. While pursuing his medical studies in Philadelphia, he attended the lectures at the University of Pennsylvania in 1787-'8, and '9. In the fall of this last year he commenced the practice of his profession at Abington, near Philadelphia; and in December, 1793, removed to the city, where he devoted much attention to obstetrics. His opportunities were excellent, as the practice was then chiefly in the hands of women, who, being uninstructed, often required the assistance of educated practitioners; to none of whom did they apply more readily than to Dr. Dewees. Fully sensible of the responsibilities of his position, he sedulously devoted himself to the study of classic authors, and especially the works of M. Baudelocque, of France. To the doctrines of this teacher he was much devoted, and he became, therefore, very influential in disseminating them among his pupils, who familiarly designated him as the "American Baudelocque." In 1797, as already mentioned, he commenced a course of lectures on Obstetrics in this city. In 1805 he received the honorary degree of Doctor of Medicine from his *Alma Mater*, presenting a thesis on the means for alleviating the sufferings of Parturition. In addition to his work on Midwifery, he published essays and cases on Obstetrics, also a most excellent practical work on the "Diseases of Women;" afterward a similar production on the "Diseases of Children," and finally a Compendium on the "Practice of Medicine," so that he became, not only an original, but one of the most voluminous writers upon professional subjects in America. In 1825 he was elected Adjunct Professor of Midwifery to Dr. James, in the University of Pennsylvania, and on the resignation of that gentleman, in the spring of 1834, he was appointed his successor. Unfortunately, his health now began to fail, and in November, 1835, he was compelled to resign his professorship and practice, and to seek a renovation of his powers by a residence in the Southern portions of our country. This hope being very partially realized, he returned to Philadelphia in May, 1840, with a broken-down constitution, and died on the 20th of May, 1841. Dr. Dewees was distinguished by the originality and force of his mental powers, by an indomitable industry and perseverance, which enabled him to overcome difficulties arising from a deficiency of early education, so that he not only became master of the fundamental principles of his profession, but so successfully reduced them to practice, that he greatly contributed to elevating and sustaining the science of obstetrics as a co-ordinate branch of the profession. Drs. James and Dewees should be regarded as the fathers of obstetric science in America: the former, erudite and polished, gave currency to the teachings of the British schools; the latter, more nervous and energetic, exemplifying, theoretically and practically, the doctrines of the French obstetricians.

It was not until 1838 that another systematic work on Obstetrics was offered to the public, under the title of "*The Philadelphia Practice of Midwifery*," by Charles D. Meigs, M.D., then a private lecturer, and afterward, in 1841, Professor of Obstetrics in the Jefferson Medical College of this city. This work, designed chiefly for students, was quite elementary; but, being received with much favor, Dr. M., in 1849, republished it in an enlarged and improved form. Several editions of this work have since been issued, and it has been adopted as a text-book in many of

our medical schools. It is characterized by the talent, taste, and erudition of the author, and presents, in a very graphic manner, his opinions and practice, and also a comprehensive view of the present condition of obstetric science. The last edition of the work was issued at the commencement of the year 1863, with many additions.

Dr. Henry Miller, Professor of Obstetrics in the University of Louisville, Kentucky, published in 1858 his work on "The Principles and Practice of Obstetrics," being a republication, in an enlarged form, of a previous edition. The work of Dr. Miller is interesting, as presenting his own opinions and teachings, and also as being the first systematic treatise on Midwifery issued from the valley of the Mississippi.

The last System of Obstetrics from the American press is from the pen of Dr. Gunning S. Bedford, Professor of Midwifery in the University of New York. This volume has been favorably noticed by American and European journalists. It evinces much reading and study on the part of the author, and, at the same time, is not deficient in important practical directions. The illustrations are numerous, and serve to enhance the value of the work.

This history of Midwifery in the United States, although short and imperfect, will illustrate how much has been accomplished during the last half century. Sixty years ago, the practice of midwifery was almost exclusively in the hands of women, most of them entirely uneducated, and governed by maxims and prejudices, too often productive of the greatest mischief. Most of the physicians, who were called upon in cases of emergency, were very superficially instructed in the peculiarities of obstetric science, and, therefore, regarded every difficult case of labor as a problem, the solution of which consisted in effecting the delivery of the infant without any respect to its welfare, so that the life of the mother might possibly be preserved. The whole aspect is now changed. Obstetrics has taken its position as coequal with the other branches of medicine. Its teachers in all our medical schools receive the attention, confidence, and respect conferred on the professors of other departments; while its practitioners are almost as numerous as the physicians and surgeons of the land, and although the employment of women, during labor, is not entirely abandoned, yet it has become greatly restricted, and even those who consider themselves as midwives, are disposed to seek for better instruction than they formerly enjoyed.

The author of the ensuing volume has not been altogether an idle spectator of these developments of Obstetric science. As early as 1823 he became a lecturer in the Philadelphia Medical Institute, founded by his friend and preceptor, the late Professor Chapman. For nine years he lectured there on the principles of surgery, and, in 1832, on the resignation of Dr. Dewees, he became the lecturer on Obstetrics. In November, 1835, he was honored with the appointment to the Professorship of Obstetrics in the University of Pennsylvania, on the retirement of Dr. Dewees. This important station he retained until 1863, having discharged the duties of a public lecturer, without interruption, for forty years, thirty-one of which had been spent in the teaching of obstetrics. During the whole of this period his time was much engrossed with an extensive private practice. He was also Physician in attendance for seven years at the Alms-House Hospital, and for thirteen years, was one of the accoucheurs at the Lying-in Department of the Pennsylvania Hospital.

The results of his experience and reflections on the theory and practice of Obstetrics he now presents to the public. Whatever may be its judgment as to the character of this work, the author has long considered it an imperative duty to the many hundreds of physicians who claim the University of Pennsylvania as their *Alma Mater*, and also to the Trustees of this Institution, to present, in an extended form, the peculiar doctrines and practice inculcated by the

Professor of Obstetrics. This duty is the more imperious, as during the long period of thirty-eight years, since the first issue of Dr. Dewees' *Midwifery*, the character of the instructions given to the classes in the University in this important department has not been officially presented to the profession.

Experience has, in all ages, testified to the great value of oral instruction, especially when enforced by demonstrations. Nevertheless, all such teachings are more or less evanescent, and, at best, imperfect, as the time allotted is short, and no opportunity is given for details, and for fixing important truths on the mind. Text-books, so called, are, therefore, sought after, but, as usually prepared, are mere compendiums. The object of the author has, therefore, been to present the teachings of his course of lectures in a more extended and permanent form, that his former pupils may be reminded of opinions and rules, perhaps long forgotten, and, at the same time, be more fully apprized of the facts and arguments in regard to the principles of obstetric science, as now maintained at home and abroad.

The above statement is presented as an apology, if any be requisite, for issuing another systematic treatise on *Midwifery*, while many excellent works from well-instructed and experienced practitioners in Europe and America are so abundantly circulated by a liberal press through the United States. The author, also, cannot but indulge the hope that a careful perusal of the following pages will indicate that he has not been satisfied with simply inculcating the opinions of others; he has always subjected such opinions to the test of clinical experience, and carefully endeavored not merely to eject that which is false, but to strengthen, and, if possible, to extend that which is true. He can truly say, in the language of M. Baudelocque, "though the reading of authors has been of great use to me, it will be found that nature has been of much more." He has endeavored, by patient observation, to ascertain every minute circumstance relating to parturition, to determine, as precisely as possible, the modes of delivery in all normal cases of labor, and to discover what efforts nature makes in abnormal or even impracticable cases, and hence to establish fundamental principles for the guidance of the obstetrician. He has ventured, therefore, to give, without reserve, his own opinions upon all points, and thus he will often be found in opposition to the best and the most admired obstetric authorities. This has been done, however, with feelings of great respect and gratitude to the distinguished men who have done so much toward elevating and maintaining this department of the profession. He feels assured, also, that these gentlemen will credit his assertion, that his only object is the discovery of truth and the establishment of correct principles, so that the practice of obstetrics shall prove of inestimable value to women and their children. Personal and national feelings and prejudices should have no influence over men of science. The works of nature, as presented by the great Creator, are the subjects of their investigation and reflection. The more these are developed and explained, the greater will be the benefit conferred. In all branches of science the advancement has been most wonderful in this century, not merely theoretically, but practically; all the interests of society have been enhanced by the direct application of scientific principles to the every-day business of life. Practitioners of medicine have not been derelict, and all will take pride in witnessing the improvement of their profession, and in contributing to make such improvement successful in alleviating human suffering.

Influenced by these motives, the author has, in this volume, endeavored to present, not simply his own opinions, but also those of the most distinguished authorities in the profession, so that it may be considered as a digest of the theory and practice of Obstetrics at the present period. In the fulfilment of this design, the plan adopted is exceedingly simple. It consists

in detailing the natural history of woman, as far as the important functions of gestation and parturition are involved, and deducing, from the facts thus elaborated, those principles which should govern the obstetrician. Much attention has been devoted especially to the natural process of labor, so as to elucidate the *modus operandi* of those powers by which the foetus is expelled, and to detail the varied physical and vital resistances offered to the descent and delivery of the child, in all the presentations and positions which it can possibly assume. This comprehends what is now known as the "Mechanism of Labor," which intimates that, although the expulsive powers and many of the resistances made to the process of descent depend on "vital forces," yet these all act in perfect harmony with the laws of mechanics. The more minutely labor is studied the more will it be apparent how wonderfully adapted are the agents employed to insure the object to be accomplished; with what precision the size and irregular convexities of the head are accommodated to the irregular concavities of the obstetric canal, so that the more difficult the labor, the nearer will be the approximation of the different circles or planes of the cranium to the planes of the canal through which it has to pass. It is the knowledge of this mechanism, in all its minute details, which can alone furnish correct principles for the guidance of the accoucheur. We heartily endorse, therefore, the declaration of M. Baudelocque, that the principles of obstetrics "are sure, all the operations of which may be carried, in a manner, to a geometrical certainty;" and also to that of M. Velpeau, who affirms that these same principles of obstetrics "give to the resources it employs a degree of precision which causes it to approach in certainty the mathematical sciences."

The study of the mechanism of labor is, however, one of acknowledged difficulty. The best minds of the profession have been exerted for its elucidation, and, although much has been done, we must believe that many deficiencies exist, and that many errors are still sanctioned by high names, which have led to corresponding errors in practice.

The "Mechanism of Labor" will be found to occupy considerable space in the ensuing pages, in reference, not merely to presentations of the vertex, to which attention has been too exclusively confined, but to all the varieties of presentations and positions to which the foetus is liable. Many may object to these minute details, but the great advantage, and even necessity of accurate information upon every point relating to the delivery of the foetus, will not be questioned by those who have had experience in tedious and difficult labors.

The author has not been satisfied in giving a simple description of the mechanism of labor or of the proper application of the vectis, forceps, and other obstetric instruments, but has endeavored, by a series of original illustrations, to render the whole subject still more clear. He has, in a great measure, abandoned the usual mode of representing the whole child, in its relation to the mother's organs, which must be necessarily more or less inaccurate. On the contrary, he has adopted the plan, prevalent in the lecture-room, of exhibiting the foetal cranium in its various relations to the different portions of the pelvis, in all the modifications of labor. His reasons are, first, the well-known fact, that the head forms the great obstacle to easy delivery; second, it is important to determine the relative size of the head in its different presentations, as compared with the dimensions of the straits and cavity of the pelvis; and third, the presentation and position of the head must be ascertained by the sutures and fontanels, which, when the denuded cranium is represented, become visible, and thus the relative positions of the fontanels and sutures, as regards the walls of the pelvis, can, at once, be perceived. Hence, a glance of the eye will reveal what circumference or plane of the head is in correspondence with any plane of the obstetric canal; and also how far the diameters and axes of the head correspond to the diameters

and axes of the pelvis. To insure accuracy upon these points, the author has not trusted to his own imagination, or to the skill of the draughtsman, but has called into requisition the wonderful art of photography, which has already been applied, with so much success, in the faithful representation of other natural objects. Excellent photographs of the cranium and pelvis have been made, showing, with great exactness, their relative size and position, and thus affording a demonstration hardly inferior to that made with the bones themselves. These photographs have been carefully transferred to stone, so that the lithographic plates, which accompany this volume, present, with great exactitude, a condensed view of the mechanism of labor, and the position occupied by instruments under the various presentations of the infant.

Moreover, to obtain a better idea than has hitherto been given of the form, size, and dimensions of the cavity of the pelvis, the author has had plaster-casts taken of it. These casts, and various sections thereof, have also been photographed. As the author has himself received much additional information of the interior of the pelvis from the study of these casts, he trusts that this novel and accurate mode of investigation will prove equally beneficial to other observers, and serve to elucidate many points, respecting the passage of the head through the pelvis, which have hitherto been obscure.

In addition to the lithographs, a large number of wood-cuts are scattered through the text. These have been selected chiefly from the works of Maygrier, Churchill, Ramsbotham, Dubois, Meigs, Dalton, and Kölliker, and will greatly assist the reader in obtaining clear ideas upon the important subjects described. To the politeness of Mr. Gemrig, Surgical Instrument-Maker, the author is indebted for the use of three or four wood-cuts representing some of the instruments.

This work is now, therefore, presented to the public as an exponent of the principles earnestly inculcated by the Professor of Obstetrics in the University of Pennsylvania, during twenty-eight years, to the large classes which have annually crowded its halls. The hope is indulged that these principles will be sanctioned by the experienced members of the profession, and that their careful study and practical application will contribute to the amelioration of human suffering, and to the still further improvement of the science of obstetrics.

The superintendence of the illustrations and the laborious duties of editor have chiefly devolved upon the author's son, H. Lenox Hodge, M.D., without whose assistance this work would probably never have been completed.

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THE PRINCIPLES AND PRACTICE OF OBSTETRICS.

CHAPTER I.

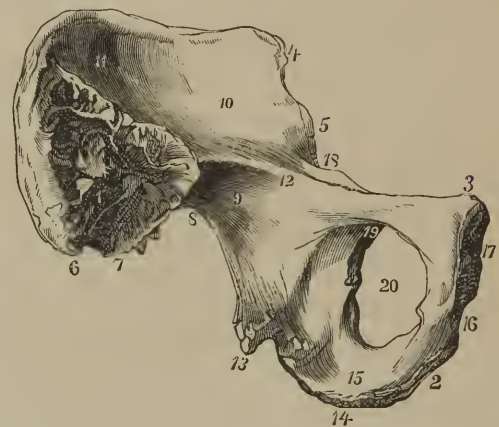
THE OBSTETRIC PELVIS.

THE pelvis is situated at the lower part of the trunk, and, in an obstetric point of view, includes the two ossa innominata, the sacrum, the os coccygis, and the three lowest lumbar vertebræ. The ossa innominata, called also the hip, haunch or coxal bones, occupy the anterior and lateral portions of the pelvis; the posterior part of which is completed by the lumbar vertebræ, sacrum and coccyx.

OS INNOMINATUM.—The os innominatum is an irregular bone, so contracted in the middle as to resemble the figure 8; in the fœtal condition it originally consisted of three bones, connected by cartilage. The union of these three bones is to be found in the acetabulum. Two-fifths of this cavity are formed by the upper bone, termed the os ilium; two-fifths by the inferior bone, called the os ischium; the remaining one-fifth by the os pubis, the anterior portion of the os innominatum.

The body of the *os pubis* meets its fellow by a perpendicular and irregular surface. The inner portion of the body is smooth and somewhat convex from above downward; the superior surface, extending outwardly to the spinous process in a horizontal direction, is often termed the tuberosity of the pubis. The horizontal ramus of the pubis extends from the body of the bone to the acetabulum. At the point of junction with the ilium there is a slight projection termed the *pectineal eminence*. The inner margin of this ramus is marked by a sharp line, extending from the spinous process to the pectineal eminence, and termed the *linea pectinea*. The superior surface is

Fig. 1.



INNER SURFACE OF OS INNOMINATUM OF THE LEFT SIDE.—1. Surface for the Sacro-iliac Ligaments. 2. Ischium. 3. Body of Pubis. 4. Anterior Superior Spinous Process. 5. Anterior Inferior Spinous Process. 6. Posterior Superior Spinous Process. 7. Posterior Inferior Spinous Process. 8. Greater Sacro-sciatic Notch. 9. Plane of the Ilium. 10. Venter of the Ilium. 11. The portion of the Venter which is continuous with the Alæ of the Sacrum. 12. Linea Ilio-pectinea. 13. Spine of Ischium. 14. Tuber Ischii. 15. Line of attachment of the Greater Sacro-sciatic Ligament. 16. Point of attachment of the Erector Penis, or Clitoridis Muscle. 17. Symphysis Pubis. 18. Ilio-pectineal Eminence. 19. Groove for the Obturator Vessels and Nerve. 20. Obturator Foramen.

triangular, smooth, and slightly concave from the spinous process of the pubis toward the acetabulum, for the accommodation of the crural vessels and nerve. The inferior ramus of the pubis extends downward and outward to meet the ramus of the ischium. It is flat, and the inner margin slightly everted, so as to project forward. The width of the ramus is about half an inch.

The *os ischium*, or inferior bone of the pelvis, consists of a body and two rami, one anterior, the other posterior. The body is of a prismatic shape, the inferior surface being rough, and termed the tuberosity; the internal surface being smooth, and inclining about one inch upward and outward, to the obturator foramen. The exterior surface inclines upward and inward to the same opening. The inner margin of the tuberosity slightly projects for the insertion of the sacral ligaments. The anterior or ascending ramus runs upward and forward to meet the ramus of the pubis, being broad below and narrowing toward the upper part. Like the ramus of the pubis, its inner margin is also everted, so as to project forward. By this eversion of the edges, the two opposing rami of the ischia present flat surfaces for the contact of the child's head during the process of delivery. The posterior ramus of the ischium runs upward from the body, gradually increasing in width, being one inch in breadth just below the spine of the ischium, and two and a quarter inches on a level with the superior margin of the obturator foramen: it joins the *os ilium* and pubis at the acetabulum. The whole of this inner surface is smooth and inclined outward in its ascent. It is bounded anteriorly by the great obturator foramen, and posteriorly by the sacro-sciatic notch; it is usually termed the *plane of the ischium*, the upper part of which is directly opposite to the acetabulum. Its posterior margin is divided into two unequal portions by a triangular projection, about half an inch in length, and termed the *spine* or *spinous process of the ischium*. This process curves slightly inward, in a hook-like manner, increasing at this point the curvature of the plane of the ischium, a fact of much practical importance. The superior or larger portion of the posterior margin of the ischium corresponds to the great sacro-sciatic foramen, the inferior or smaller portion corresponds to the smaller sacro-sciatic foramen.

The *os ilium*, or the upper and larger portion of the *os innominatum*, runs obliquely outward. It is flat and of a triangular form, with irregular edges or margins. The inferior angle is irregular and truncated, and forms a portion of the acetabulum. The anterior margin extends upward and outward to the superior angle, which slightly projects, and is termed the *anterior superior spinous process* of the ilium. This anterior margin or edge is divided toward the inferior part by another projection, termed the *anterior inferior spinous process* of the ilium. The space below this is smooth and convex from within outward, for the accommodation of the flexors of the thigh. The superior margin extends backward and inward to another projection, termed the *posterior superior spinous process* of the

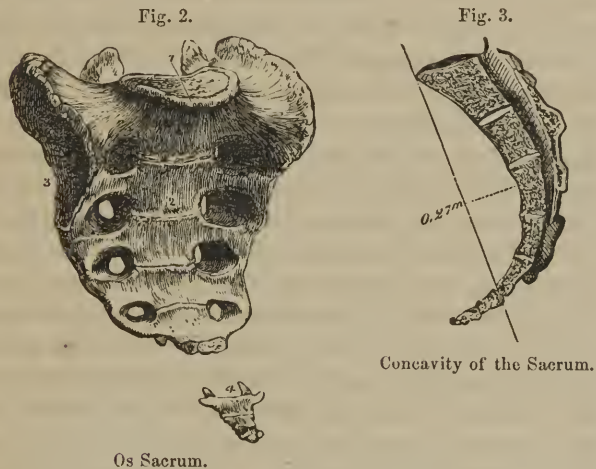
ilium. This upper margin measures about eight or nine inches in length, and is usually termed the *spine* or *crest* of the ilium. It curves outwardly and then inwardly, so as somewhat to resemble the letter "S." The inferior margin extends obliquely from the acetabulum to the posterior superior spinous process. It also is unequally divided into two parts by a projection termed the *posterior inferior spinous process*; the longer or anterior portion is smooth and rounded, forming the boundary, superiorly, of the great sacro-sciatic notch: the posterior portion of the margin is irregular for the origin of ligaments, etc.

The obstetric student will observe that the whole internal surface of the bone is divided, toward the posterior portion, into two surfaces; the posterior portion being rough with various irregularities, a part corresponding with the sacrum, and a portion occupied by the posterior ligaments of the pelvis. The remaining portion of the inner surface is smooth, and is divided into a large superior and a smaller inferior surface, by a prominent rounded line, extending from the pectineal eminence to the sacro-iliac junction. It is termed the *linea ilia*: this is a continuation of the *linea pectinea*, and the whole line, extending from the spinous process of the pubis to the sacrum, is known by the name, *linea ilio-pectinea*, and should be constantly borne in mind as forming, with its fellow on the opposite side, a large portion of the line of demarcation between the cavity of the abdomen and that of the inferior pelvis. The smooth portion of the ilium, which extends from the *linea ilia* to the inferior margin of the ilium, has an inclination corresponding to that of the plane of the ischium, and contributes to the formation of the cavity of the pelvis. All the smooth portion above the *linea ilia* inclines rapidly outward; and extends from the sacrum posteriorly to the anterior margin of the ilium. It is slightly concave, and hence is termed the *iliac fossa*.

The *os innominatum*, thus formed of these three bones, should be studied in its totality. The large foramen, termed *obturator* or *thyroideum*, will be found situated anteriorly and below the acetabulum. The obturator foramen is bounded superiorly by the horizontal ramus of the pubis; internally by the body of the pubis and the anterior rami of the pubis and ischium, and posteriorly by the posterior ramus of the ischium. The form is irregular, approximating to the oval in the male subject, and to the triangular in the female. The length of the *os innominatum*, from the symphysis pubis to the posterior superior spinous process of the ilium, is seven inches; its perpendicular depth at the symphysis is one inch and a half, or eighteen lines. The bone gradually increases in depth

to the top of the crest of the ilium, and there it measures seven inches to the tuberosity of the ischium; thence it diminishes to the posterior superior spinous process, where it again measures one inch and a half to the inferior posterior spinous process. A line drawn from the anterior superior spinous process to the tuberosity of the ischium, measures six and a half inches. The length of the ilium, from the anterior superior to the posterior superior spinous process, measures six inches, in a straight line; and the spine on the crest of the ilium, owing to its curvatures, measures eight inches.

OS SACRUM.—The os sacrum, situated between the two ossa innominata, completes, posteriorly, the circle of the pelvis: it is the keystone of the arch. Its general shape is wedge-like; it is often compared to a truncated, flattened pyramid inverted—the base being above, the truncated apex below. It is not flat, but curved; the



OS SACRUM.—1. Promontory. 2. Body of the bone. 3. Articulating surface for the ilium. 4. Coccyx.

convexity being posterior, and concavity anterior. This bone, in the foetal condition, consists of five pieces, analogous in their structure to the vertebræ; and being a continuation of the spine or vertebral column, they are termed the false vertebræ. The cartilaginous connections between them ossify soon after birth, so as to form but one bone, the os sacrum. The lines of demarcation upon the anterior surface are of a light color, slightly elevated, and run in a transverse direction. The sacrum may be described as having a base, a truncated extremity, two lateral edges and an anterior and posterior surface. The base or upper extremity is about four inches broad, and is divided into three surfaces: one central, and two lateral. The central portion is flat, somewhat rough, and corresponds to the inferior surface of the last lumbar vertebra. Its posterior margin has two oblique processes for the

reception of the articular processes of the same vertebra. The anterior margin projects forward, and is hence termed the *promontory* of the sacrum. This encroaches so considerably upon the pelvis, as to have an important influence on the processes of gestation and parturition. This projection is continued by the lumbar vertebræ, and is most conspicuous in the erect position. The two lateral surfaces of the base of the sacrum are smooth, slightly concave from within outward, and convex from above downward. They extend from the promontory to the sacro-iliac junction, and are termed the *ala* or *wings* of the sacrum. The lower or truncated extremity of the bone is small, elliptical, and slightly convex. Its transverse diameter measures about twelve lines, and its antero-posterior diameter four to six lines. It corresponds to the first bone of the os coccygis. The margins or edges of the os sacrum are divided into two nearly equal portions; the superior presents an irregular, flat, sigmoid surface, corresponding to a similar surface of the os ilium, to which it is joined, and forms the sacro-iliac junction. This portion of the edge is therefore thick, and is continued as low down as the inferior spinous process of the ilium. All below this point the margin is comparatively thin for the origin of the ligaments, passing to the ischium. The posterior face or surface of the bone is very convex and irregular for the origin and insertion of muscles and ligaments, being divided into two lateral portions by spinous processes nearly to the inferior portion of the bone, where they are usually deficient, exposing the termination of the great vertebral canal. On each side of these processes four foramina are to be observed, communicating with the spinal canal, for the transmission of nerves to the tissues of the nates.

The anterior surface or face is comparatively smooth, and extends from the promontory of the sacrum to the os coccygis. It is slightly concave at the upper portion, and much more so at the lower part. The degree of concavity varies in different subjects; it has usually been estimated at six lines; but in many preparations it measures at least eight or ten lines. This surface is marked by the transverse lines or remains of the cartilage between the false vertebræ. At their extremities, on either side, are large foramina for the transmission of the great sacral nerves, which in their passage are accommodated by slight grooves running in an oblique direction to the margin of the bones. The whole length of this surface in a straight line measures four inches and a half, and its breadth above is four inches, and below about one inch.

The thickness of the sacrum, measured, on account of its obliquity, from the promontory to the superior

spinous process, is, according to Baudelocque, two inches and six lines; this measurement is important in estimating the antero-posterior diameter of the superior strait.

Os Coccygis.—The coccyx constitutes the true termination of the os sacrum. It is formed of three or four bones, the superior being comparatively large, about an inch in breadth, and the inferior or terminating point is quite small, not more than three or four lines in width. It, like the sacrum, represents the false or imperfect vertebræ. The superior extremity of the first bone forms a concave elliptical surface for the articulation of the extremity of the sacrum; the lower extremity is convex for articulation with the concave surface of the second bone; and so of the others. These articulating surfaces are connected by fibro-cartilaginous matter, which seldom becomes ossified, so that these bones in the adult admit of flexion and extension. When at rest the position is that of flexion.

The coccyx thus formed, may be regarded as of a wedge-like shape, the base of which is above, concave on its anterior, and convex on its posterior surface. Its length is about fourteen or fifteen lines; it is twelve lines in breadth at its base, and three or four lines at its extremity.

This bone, being virtually a continuation of the sacrum, turns inward so as to augment the hollow or concavity of the sacrum; the depth of this cavity, extending from the promontory of the sacrum to the extremity of the coccyx, represented by the perpendicular to the chord of the arch, (Plate III., Fig. 17,) measures twelve or fifteen lines. When, however, the os coccygis is pushed backward, as in labor, this cavity is diminished.

LUMBAR VERTEBRÆ.—The three inferior lumbar vertebræ ought also to be regarded as part of the obstetric pelvis, and be studied accordingly in all their anatomical relations, especially as regards their anterior projection encroaching on the superior portion of the pelvis.

CONNECTIONS OF THE BONES OF THE PELVIS.

Symphysis of the Pubis.—The two ossa pubes join each other in front, and the two ossa ilia are connected with the sacrum behind, by means of fibro-cartilaginous tissues termed symphyses. The *symphysis of the pubis* is formed by two plates of cartilage interlaced with fibres closely adherent to each surface of the bone. This tissue is irregular in form, and is not more than one line in breadth behind, but from

four to six lines anteriorly; so that it has a wedge-like shape. The base of the wedge in front is contracted toward the middle, being larger toward the upper and lower portions of the bones. The interstices of this cartilage are occupied by small bodies, supposed to be synovial glands. In the centre of this articulation, there is a small cavity, measuring about eight lines in length from above downward, and three lines in width from the anterior to the posterior part. This is lined by a synovial membrane containing fluid; this is an arthrodia, or the apparatus of a joint in the centre of the symphysis pubis.

This junction of the bodies of the pubes is very close and strong; much additional strength however is given by internal and external, superior and inferior ligaments. The internal ligaments are very delicate, being little more than strong fibres of the periosteum, extending from one side to the other; anteriorly these fibres from the periosteum are stronger, and receive assistance from the tendons of the gracilis, adductor, and other muscles of the thigh. The superior ligaments consist of strong fibres connected with the tuberosities of the pubes, and receiving much assistance from the interlacing of the fibres of the columns of the tendons of the external oblique muscles of the abdomen. Inferiorly, this articulation is greatly strengthened by the *sub-pubic* or *triangular ligament*, which consists of strong fibres running transversely from the ramus of the pubis on one side to the opposite, and forming an intimate connection with the fibro-cartilaginous tissue of the symphysis. This ligament is from six to eight lines in length at its lowest part, where it is rounded and forms the top of the arch of the pubis.

The Sacro-iliac Symphysis.—This is also formed of fibro-cartilage, very thin, and is said to be composed of two laminæ or plates, intimately connected with the rough sigmoid surfaces of the ilium and sacrum. The adhesion is very strong; when ruptured, it presents an irregular lacerated surface. This symphysis is strengthened by anterior, posterior, superior, and inferior ligaments.

The anterior ligaments consist chiefly of a strong periosteal membrane, while posteriorly, we have some of the strongest ligaments in the body, extending from the rough posterior surfaces of the os ilium to the superior posterior surfaces of the sacrum. These, described under the name of the *sacro-iliac ligaments*, are somewhat elastic, and firmly bind the sacrum to the ilium, effectually preventing any displacement.

Of the superior ligaments, two may be noticed: one the *sacro-lumbar*, the other the *ilio-lumbar*. They have a common origin, from the transverse and oblique processes of the last lumbar vertebræ. The former, or

sacro-lumbar, is inserted into the sacrum; the ilio-lumbar runs in a transverse direction to the spine or crest of the ilium, on which it spreads by a falciform process. These two ligaments fill up the notches between the ilia on each side of the lumbar vertebræ, and thus serve to complete the concavity of the iliac fossa on either side, while at the same time they strengthen the sacro-iliac junction.

The inferior ligaments are two in number, and are situated toward the lower part of the pelvis. They have a common origin, along the outer edge of the sacrum and coccyx, from the posterior inferior spinous process of the ilium to the extremity of the coccyx, and also from the posterior rough portions of the sacrum. From this common origin the fibres converge toward the middle of the sacro-sciatic notch, where they diverge, forming two ligaments; one superior, anterior and shorter, runs to the spinous process of the ischium, and is called the *superior sacro-sciatic*, or *sacro-spinous* ligament; the other inferior, posterior and longer, extends, by a falciform process, along the inner margin of the tuberosity, as far forward as the crus of the ischium, thus forming, with its fellow, a large portion of the circumference of the outlet of the pelvis. It is usually termed the *inferior sacro-sciatic ligament*. By these two ligaments the sacro-iliac junction is strengthened, and the great sacro-sciatic notch is divided into two foramina; one, large and superior, is nearly circular, and transmits important blood-vessels and nerves; the other is inferior and triangular, and is occupied by the tendon of the internal obturator muscle, blood-vessels, etc.

Coccygeal Junctions.—The connections of each bone of the coccyx with each other, and of the upper bone with the extremity of the sacrum, is also by fibro-cartilage, analogous to the intervertebral substance. They are said to be furnished with synovial membranes, hence a motion of flexion and extension exists between the sacrum and the first bone of the coccyx, and also between the different bones themselves, of great value during the process of labor. These cartilaginous tissues seldom become ossified. According to Lenoir, ossification more frequently occurs between the third and fourth bone, than between the sacrum and the first bone; and still less frequently between the first and second bone. Occasionally, however, all these tissues are ossified, making the coccyx one with the sacrum, incapable of motion, and constituting a very serious hinderance to the process of delivery.

These joints are strengthened by anterior and posterior ligaments, and the inferior sacro-sciatic ligaments, extending along their edges to the extremity of the coccyx, prevent, to a great degree, lateral motion.

Sacro-vertebral Junction.—The obstetric student should also study the character of the connections of the several vertebræ of the spine with each other, especially in the loins. The wedge-like form of the intervertebral cartilage, the base of which being anterior, contributes alike to the convexity of the lumbar vertebræ anteriorly, and to the obliquity of the sacrum. The degree of this obliquity varies, but is usually estimated at one hundred and thirty-five degrees. The articular processes allow of flexion and extension, and also of rotation. Doubtless each of these movements may exist between the last lumbar vertebræ and the sacrum, but of course to a very moderate extent.

It should be observed that the *obturator foramen*, already described on the anterior portion of the pelvis, is occupied by an aponeurotic membrane, closing it entirely, with the exception of a small opening at the superior and outer angle, for the transmission of the obturator vessels and nerve. Attention should be also paid to the lower margin of the tendon of the external oblique muscle on either side, usually termed "Poupart's ligament," extending from the anterior superior spinous process of the ilium to the pubis, where they divide into two columns; the superior column or fibres cross and are inserted into the tuberosity of the pubis on the opposite side, while the fibres of the inferior column are inserted into the tuberosity of the pubis, into the spinous process, and by a falciform edge, termed "Gimbernat's ligament," along the linea pectinea.

THE USES OF THE PELVIC JUNCTIONS.—Much discussion has existed as to the uses of the sacro-iliac and the pubic symphyses. It seems now to be generally admitted that they do not contribute in any degree to facilitate the process of parturition. The intervention of elastic cartilaginous plates between the bones, especially when taking into consideration the existence of the small synovial cavity in the centre of the symphysis pubis, must serve simply to give an elastic character to the osseous circle of the pelvis. The great advantages of this elasticity in the ever-varying motions of the body, and especially in cases of violent jars, falls, blows, etc., will be readily perceived. It has, however, been formerly contended that relaxation of these tissues occurs during the period of labor; and analogies have been drawn from some of the inferior animals to support this opinion. No facts can be positively adduced to maintain this hypothesis in a healthy woman. No such relaxation can be perceived by the most careful observation during the process of labor. The thinness of the cartilaginous plates, and their close adhesion to the bones, preclude the idea of

any relaxation which could be efficient. To secure any material addition, for example, to the antero-posterior diameter of the pelvis, there must be a separation in a lateral direction of the bones to a great degree. Experiments upon the dead subject show that this separation must be equal to one inch, or an inch and a half to gain even one-quarter of an inch in the sacro-pubic diameter. This degree of separation certainly never occurs during life. Further allusion to this subject will be made hereafter, in describing the Sigaultian operation, in cases of difficult labor.

THE OBSTETRIC PELVIS.

The collection of bones and ligaments now described as constituting the human pelvis must be minutely studied by the obstetrician in reference to the processes of gestation and parturition. Although very irregular in form, they may be compared to a truncated cone, the base being superior, and the truncated apex inferior. (Plate I., Figs 1 and 2.) The pelvis is so obliquely attached to the spinal column that the tuberosities of the ischia represent the lowest part, and the middle of the crest of the ilium the highest portion.

The anterior surface, on the exterior portion of the pelvis, must be considered as extending from one acetabulum to the other, and from the tuberosities of the ischia to the superior surface of the bodies, and the horizontal rami of the pubes. There will be observed, on either side, the obturator foramen with its membrane, and at the middle, the symphysis pubis connecting the bodies of the bones, and also the great arch of the pubis. That this arch really belongs to the anterior surface of the pelvis, is a fact of much importance, to which allusion will frequently be made. The posterior and lateral portions of the pelvis, externally, require no special study with reference to obstetrics.

Internally, the pelvis may be divided into two parts. The line of demarcation should extend from the tuberosities of the pubis along the linea pectinea, and the linea ilia to the margins of the alæ and promontory of the sacrum. A section made in this direction will separate the lumbar vertebræ, and all the superior portions of the ilia, from the sacrum, the inferior portions of the ilia, and the whole of the ischia and pubes. All above the linea ilio-pectinea, is termed the *superior pelvis*, while that below is called the *inferior pelvis*. (Plate I., Fig. 4.)

SUPERIOR PELVIS.—The *superior pelvis* constitutes part of the general cavity of the abdomen, and is termed sometimes the *pavilion* or *entrance*, being occu-

piated by the lower portion of the uterus and child during the latter period of utero-gestation. The bones which enter into its formation are the lumbar vertebræ behind, and the spreading portions of the ilia on either side; posteriorly, we have the ilio-lumbar and sacro-lumbar ligaments, while the remaining portions of the circumference are completed by the soft parietes of the abdomen. The lumbar vertebræ, owing to their convexity and the obliquity of the pelvis, project considerably forward, so as to imperfectly divide the superior pelvis into two lateral portions. This has an important influence upon the position of the uterus and child during the parturient state. Laterally, the dimensions of the superior pelvis are uniform, depending upon the bony character of the parietes; but, anteriorly, the muscular wall of the abdomen accommodates itself to the ever-varying size of the viscera. The transverse diameter, from the middle part of the crest of the ilium to the opposite point, measures in the female generally *eleven* inches; that from the anterior superior spinous process on one side to the same point on the opposite, usually *nine* inches; that from the linea ilia on one side to a corresponding point on the opposite, measures but *five and a quarter* inches, owing to the obliquity of the bones of the ilia. The depth of the superior pelvis from the top of the crest of the ilium to the linea ilia is *three and a half* inches. The smooth concavity of the inner surface of the superior pelvis has already been noticed in speaking of the iliac fossa.

INFERIOR PELVIS.—A knowledge of the basin or canal of the pelvis is a subject of the most essential importance to the accoucheur. This knowledge, notwithstanding all that has been written upon the subject, is still imperfect. Many difficulties necessarily exist, as is proved by the want of accuracy, as well as by the discrepancy, in the opinions of the best writers. To diminish, therefore, these difficulties, and to obtain, if possible, more precise information of the form and dimensions of the canal of the pelvis, the author has had a "cast" taken, by an experienced artist, of the interior of the pelvis, from the superior to the inferior orifices.

This cast represents, therefore, with the greatest accuracy, the form of the cavity of the pelvis, and the shape of the entrance and exit of the canal. By making various sections of this cast in a horizontal and vertical direction, a correct representation will be given of the different planes of the pelvis, of their relative form, and of their exact dimensions. To prevent, if possible, any error, the cast and its sections have been photographed, and then carefully lithographed; thus

Fig. 1

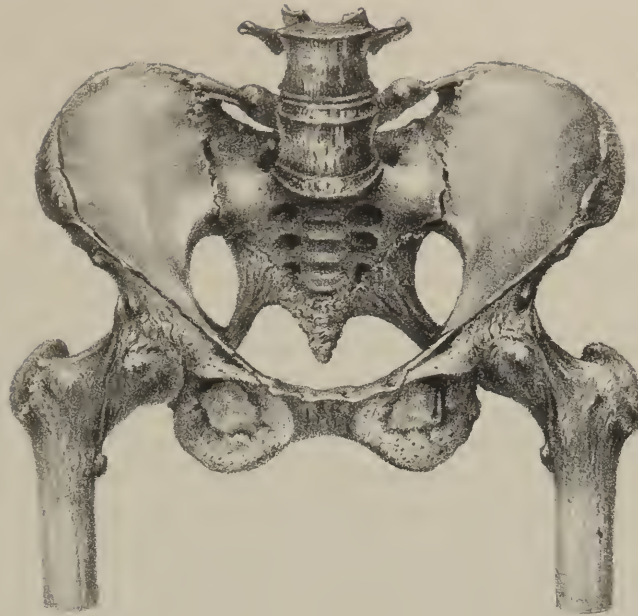


Fig. 2

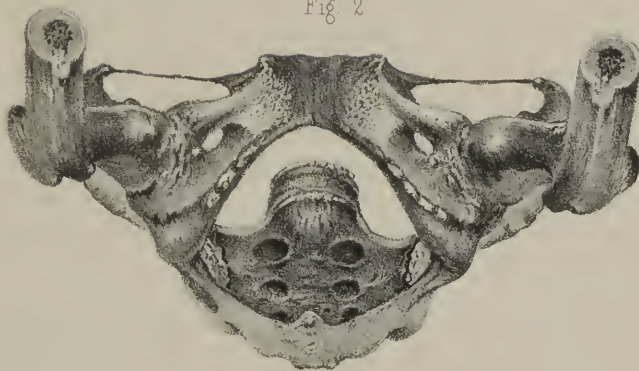


Fig. 4

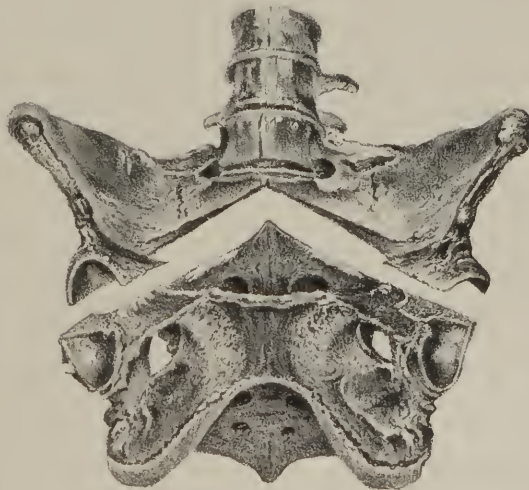
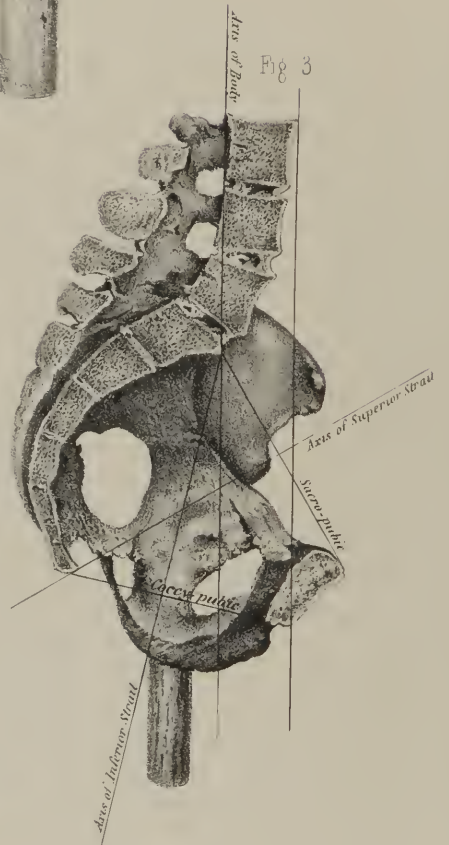


Fig. 3



presenting to the eye a very perfect view of the whole interior of the pelvis, of its shape, of its planes, and the relative size of their diameters.

The study of the pelvis will be greatly facilitated by careful attention to these drawings, which will, we think, reward the student for the time and labor bestowed upon the investigation.

The pelvis employed is of an average size, and is the same used for all the illustrations given in the plates of this work, excepting those exhibiting a lateral section, where another pelvis has been used. An advantage of thus assuming one pelvis as a standard, is to preserve uniformity as regards the dimensions, angles, inclinations, etc., of the pelvis, which necessarily vary in different subjects, and concerning which there is an apparent discrepancy among teachers.

The *inferior pelvis* embraces all that portion of the pelvis below the linea ilio-pectinea. It is formed of the sacrum, the coccyx, the lower portions of the ilia, the bones of the ischia and pubes, and the sacro-sciatic ligaments. Although thus comprising most of the bones of the pelvis, it is smaller than the superior pelvis as regards its diameters. Its general shape is conoidal, the base being above, and the truncated apex below. It forms the passage or canal through which the child has to pass in delivery; it must therefore be well understood by the obstetrician, as the difficulties of labor very generally occur within its borders. Hence, it is emphatically called *the pelvis*. It is also termed the *canal*, the *basin*, the *lower pelvis*, the *excavation*.

This inferior pelvis forms, therefore, a canal very slightly curved anteriorly. We speak of the entrance and exit of this canal; the former is the superior, and the latter the inferior opening. The space between these openings is usually denominated the *cavity of the pelvis*. It will be found that its diameters are rather larger than those of the entrance or exit. Hence, the superior and inferior openings are somewhat contracted, and have, therefore, been denominated the *straits of the pelvis*. Delays, or difficulties in labor occur more frequently, therefore, at the entrance and exit of the pelvis than in the cavity. This is especially the case at the inferior outlet, where the contraction is greater.

Superior Strait.—The *superior strait* of the pelvis, very frequently termed the *brim*, and which we shall often denominate the *first plane*, or *parallel* of the pelvis, is irregular in its form. (Plate I., Fig. 1, and Plate II., Fig. 8.) In the young subject, and in the male, it is of a triangular shape, but in the adult female it is more elliptical, owing to an increase of the transverse diameter, with an augmentation of the curvature of

the pubic portion, and indented posteriorly by the projection of the promontory of the sacrum. The posterior portion of the circumference therefore is far from regular; the central portion forming a convex projection anteriorly, while upon either side there are concavities formed by the *alæ* of the sacrum. Hence, something of the triangular form still remains in the adult female, and it has been compared to the figure of a heart on cards. This triangular shape is augmented by the *psœ* muscles which encroach somewhat on the transverse diameter of the brim.

We speak, therefore, of the *circumference*, *diameters*, *plane*, and *axis* of the superior strait of the pelvis. These expressions are used in a mathematical sense, inasmuch as in speaking of the plane of the strait, no reference is made to depth or thickness. It is a mere surface.

The *circumference* of the superior strait is bounded anteriorly by the inner margin of the tuberosity or horizontal portion of the pubis on either side, by the spinous process, the linea ilio-pectinea and the inner margin of the *ala* of the sacrum; and posteriorly by the promontory of the sacrum. The whole of this circumference measures about *thirteen and a half* inches.

The long diameter of this elliptical opening is transverse, extending from a point in the linea ilia on one side, to a corresponding point on the opposite side: it measures *five and a quarter* inches in the bony preparations. It is therefore termed the *bis-iliac* diameter.

The short or conjugate diameter extends from the promontory of the sacrum to the symphysis of the pubis. It is termed the *antero-posterior* or *sacro-pubic* diameter of the superior strait. It usually measures *four* inches in length. Of course, any number of diameters may be drawn; but for practical purposes only two others need be noticed. One extending from the pectineal eminence on the right side, opposite the anterior portion of the acetabulum, to the left sacro-iliac symphysis, and the second from the pectineal eminence on the left side, to the right sacro-iliac symphysis, each measuring *five* inches. They are frequently termed the right or the left *oblique*, the right or left acetabular or cotyloid diameters. The left oblique extends from the left acetabulum, and the right oblique from the right acetabulum. We shall thus employ these designations, but the student should be informed that many writers unfortunately term the left oblique the "right," because it extends from the right sacro-iliac symphysis; and so also the right oblique is called by them the "left." These two diameters should, in practice, be considered as the representatives of all the oblique diameters of this strait. Two other diameters have, however, been mentioned by Burns, Vel-

peau, Stoltz, Nægèlè, etc., to give a more full idea of the dimensions of the superior strait, in reference especially to deformities which are occasionally found in practice. They may be termed the sacro-acetabular or sacro-cotyloid diameters. They run from the centre of the promontory of the sacrum to that portion of the linea ilia opposite to the central portion of the acetabula, and measure, in the healthy female, three and a quarter inches.

The *plane* of the superior strait must be regarded as a mere surface, bounded by the circumference just described. It does not encroach on the cavity of the pelvis, in the same manner as a window does not encroach upon the size of a room; it is a mere orifice or opening from the superior into the lower pelvis.

The *axis* of this plane is, of course, represented by a line drawn through its centre, at right angles to its surface. This line, when prolonged, will strike inferiorly toward the termination of the coccyx, and anteriorly, or superiorly, will pass out of the body, through the linea alba, below the umbilicus. (Plate I., Fig. 3.) It is apparent, therefore, that the space around the coccyx is directly parallel or opposite to the plane of the superior strait. It may be termed the coccygeal region, or plane. It is, in reality, the bottom of the pelvis.

Inferior Strait.—The *inferior strait* of the pelvis, the *opening, outlet, or exit*, is smaller than the superior, more irregular in its form, but may nevertheless be regarded as presenting an elliptical surface with its *circumference, diameters* and *axis*. (Plate I., Fig. 2.)

The *circumference* is bounded anteriorly by the sub-pubic ligament; on either side by the inner margin of the rami of the pubis and of the ischium, and of the tuber of the ischium; and posteriorly by the margin of the inferior sacro-sciatic ligaments and the extremity of the coccyx. This circumference measures *twelve inches*. It is irregular, owing to the triangular projections of the bodies of the ischia laterally, and of the coccyx and connecting ligaments posteriorly. Practically, however, it may be regarded as a simple plane, through which the child passes on its exit from the pelvis. (Plate II., Fig. 9.)

The *diameters* to be studied are four in number: one, the long diameter, extending from the os coccygis to the sub-pubic ligament, and therefore termed the antero-posterior or *coccy-pubal* diameter. It measures *four and a half inches* during labor, when the coccyx is extended, but only four inches when this bone is at rest. The transverse or conjugate diameter extends from the inner margin of the tuber of the ischium, on one side to the opposite, and is hence termed the *bis-ischiatic* diameter: it measures *four inches*. The

oblique diameters are of less importance; they extend from the right or left junction of the rami of the pubis and ischium to the middle of the inferior sacro-sciatic ligament, on the opposite side, and measure also *four inches*.

The *plane* of the inferior strait is not easily described, inasmuch as from the pubis to the coccyx, if we follow the projections of the ischia, it is a convex surface; practically, however, it may be described as an oval opening, the long diameter, owing to the retrocession of the coccyx during labor, being antero-posterior, and the short diameter being transverse. At the posterior portion of this ovoid surface is a triangular indentation made by the os coccygis; while laterally the triangular bodies of the ischia project below the level of the plane, that is, below the sub-pubic ligament and the coccyx.

This plane, like that of the superior strait, is to be regarded as a mere surface, without depth or thickness. Its *axis* is represented by a line drawn perpendicularly through the centre of the plane, midway between the pubis and the coccyx, which, when prolonged, will strike the promontory of the sacrum; when, however, the coccyx is pushed back, during the passage of the child's head, this axis, in its prolongation, will strike the first bone of the sacrum. (Plate I., Fig. 3.)

The Cavity of the Pelvis.—The *cavity, basin, or canal of the pelvis*, includes all the space between the superior and inferior straits. It is an irregular passage, contracted at its superior and inferior openings, but enlarged below the promontory of the sacrum by the concavity of the latter. It is slightly curved anteriorly, and its superior strait is oblique to the inferior. The degree of obliquity is measured by the angle made by the junction of their planes when extended beyond the pubis. (Plate III., Fig. 23.) This angle, although varying much in different subjects, may be considered as equal to fifty degrees. Of course, the axis of the superior strait and that of the inferior will decussate in the pelvis at the same angle.

The depth of the pelvis anteriorly at the symphysis pubis is *one inch and six lines*; posteriorly, from the promontory of the sacrum to the os coccygis, it measures about *four inches and nine lines*, or, when the coccyx is extended, as in labor, *five inches*. The lateral depth, from the tuberosity of the ischium to the linea ilia, is *three and a half inches*. It thus appears that the depth of the pelvis rapidly increases from the anterior to the posterior portion.

As has been already mentioned, the sacro-pubic diameter of the superior strait measures four inches, but a line drawn from the sub-pubic ligament to the promontory of the sacrum measures *four and a half*

Fig 5

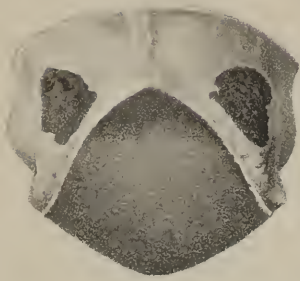


Fig 7.

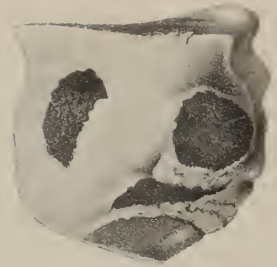


Fig 6

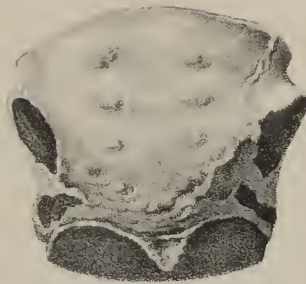


Fig 8.



Fig 10.

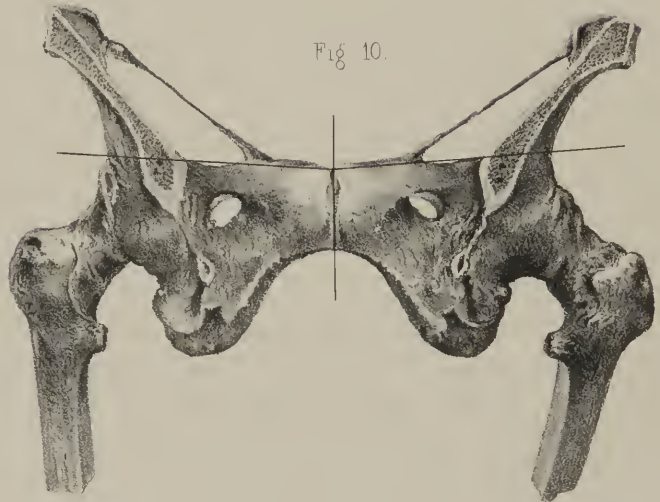


Fig 9.

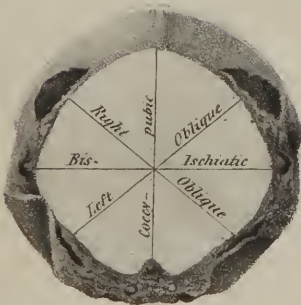
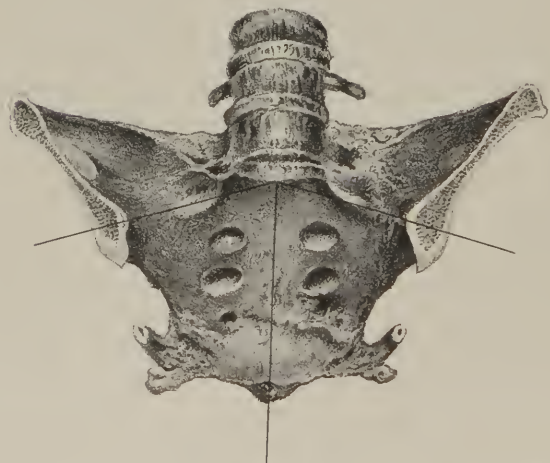


Fig 11





inches. (Plate III., Fig. 17.) This can often be estimated in the living subject; so that, by deducting six lines, we can approximate to the true length of the conjugate diameter of the superior strait; this will be found of considerable importance in cases of deformed pelvis. The longest diameter, from the anterior to the posterior part of the pelvis, is from the sub-pubic ligament to the middle of the sacrum, and measures *four and three quarter inches.* (Plate III., Fig. 17.) The greatest of the diameters of the cavity of the pelvis extends from the tuberosity of the ischium, on either side upward to the sacro-iliac symphysis on the opposite side, and measures at least six inches.

It has been stated that the transverse diameters of the superior and inferior straits differ, the former being one inch and six lines longer than the other; this diminution, from the superior to the inferior portion of the pelvis, is quite gradual and regular, owing to the inclination of the sides of the pelvis inward as they descend. Lines drawn on either side, parallel to the walls of the pelvis, would meet each other at twelve inches below the outlet of the body. (Plate III., Fig. 22.)

Studying the interior of the pelvis, attention should be fixed upon its anterior, posterior, and lateral portions, and also on the different planes and diameters through which the child must pass in descending from the superior to the inferior strait.

The Anterior Portion may be considered as comprising the whole space between the planes of the ischia, and extending from the linea pectinea to the tubers of the ischia. In the centre of this portion, therefore, we have the bodies of the pubes, convex on the interior surface, and very oblique, running downward and backward when the patient is erect, but passing downward and forward in the supine position. On either side are the obturator foramina; below these, the rami of the pubes and ischia, and also the arch of the pubis. This arch is an acute angle in the male, measuring, according to Sæmmering, from sixty to eighty degrees, while in the female, the arch is much more regular, and may be represented, according to the same author, by an angle of ninety degrees. The base of the arch is represented by a line from one tuber of the ischium to the other; it measures four inches. The height of the arch from this line is *two inches.* This, added to the depth of the symphysis pubis, makes three and a half inches, and represents, therefore, the true depth of the anterior portion of the pelvis. The limbs of the arch, as formed by the rami of the pubes and ischia, measure about two and a half inches. (Plate II., Fig. 5.)

The Posterior Portion of the pelvis is much exca-

vated, being not only concave from one side to the other, but even more so from above downward, from the promontory of the sacrum to the termination of the coccyx; and the degree of this concavity, as formerly mentioned, is equal to about one inch and three lines. (Plate III., Fig. 17.) Owing to the form of the sacrum, this concavity is much greater below than above; the upper part of the sacrum, although slightly concave and very oblique, runs nearly in a straight direction backward; while, below, the sacrum bends or turns rapidly forward. This upper, comparatively straight portion of the sacrum, is opposite and nearly parallel to the oblique internal surface of the pubis. This anatomical fact is of considerable importance in the study of the mechanism of labor. The posterior region of the pelvis may be considered as including the whole of the sacrum and coccyx, portions of the great sacro-sciatic foramina, and the sacro-sciatic ligaments. It has been sometimes termed the posterior plane of the pelvis, and, beyond the bones, is continued by the perineum to the orifice of the vagina. (Plate III., Fig. 6.)

The Lateral Portions, on either side, include the whole of the ischium and pubis, the half of the sacrum and coccyx, and a small or descending portion of the ilium. Here also will be observed, in their relative position, the obturator and sciatic foramina, separated by the plane of the ischium. (Plate II., Fig. 7.)

THE INCLINED PLANES OF THE PELVIS.—In considering the internal surface of the pelvis, with reference to the passage of the child's head during delivery, and the means of facilitating those changes requisite for its easy transit, we must describe what has been termed the *anterior and posterior lateral inclined planes* of the pelvis. The line of demarcation between these has not, we think, been correctly pointed out. Moreau, Cazeaux, and others, have divided the pelvis into four equal parts; but minute attention to the mechanism of labor, and the form of the pelvis, demonstrates that these sections should be unequal. On account of the undeniable fact, that the occiput of the child most frequently is rotated under the arch of the pelvis, instead of being directed backward toward the hollow of the sacrum, the author has no doubt, after close observation of the process of delivery, that, as these planes have a very positive influence upon the relation of the head, the point through which the section should be made, is the extremity of the hook-like process, termed the spine of the ischium. Let a section, therefore, be made of the pelvis through the symphysis pubis and the middle of the sacrum and coccyx, and another or transverse section, commencing about

three-quarters of an inch in front of the sacro-iliac symphysis, extending downward to the extremity of the spine of the ischium, so as to divide also the inferior sacro-sciatic ligament about one inch and a half from the tubers of the ischia. Of these four sections of the pelvis the two anterior sections are larger than the posterior. (Plate II., Figs. 10 and 11.) The *anterior* lateral inclined plane, therefore, extends from the symphysis pubis to the extremity of the spine and to the posterior margin of the plane of the ischium. It embraces, therefore, the whole of the pubis and ischium, including the obturator foramen, and also the descending portion of the ilium below the linea ilia, and a large portion of the inferior sacro-sciatic foramen. The inclination of this plane is double, being from above downward and inward, corresponding to the inclinations of the sides of the pelvis already mentioned; and also from behind forward from the transverse vertical section just mentioned toward the symphysis pubis and vulva. The inclination of this plane necessarily varies, at different portions of the pelvis, being slight above, and much greater below, as is represented on the transverse sections of the cast. (Plate III., Figs. 19, 20, and 21.)

The *posterior* inclined plane extends from the middle line of the sacrum and coccyx to the spine and the plane of the ischium. It is formed, therefore, by one half of the bones just mentioned, a small portion of the os ilium below the linea ilia, the whole of the great sacro-sciatic foramen, all of the superior and part of the inferior sacro-sciatic ligaments. The inclination of this plane is also double; it runs downward from the promontory of the sacrum to the coccyx, and also backward and inward from the spine of the ischium to the median line of the sacrum.

Although the perpendicular depth of the inclined planes is great, yet, in reference to the rotation of the head, their length must be estimated by lines drawn from the middle of the sacrum and coccyx to the transverse perpendicular section, as shown in the figures just referred to. The posterior plane, therefore, is short as compared to the anterior, and runs in an opposite direction. The anterior planes may be said to look upward, backward and inward, while the posterior planes look upward, forward and inward. The greater length of the anterior planes will explain the fact, already alluded to, that the occiput of the child not only in transverse, but in many cases of posterior oblique positions, will rotate anteriorly under the pubis.

Let it moreover be observed that, as the posterior and lateral regions of the pelvis are prolonged by the soft tissues, these inclined planes extend to the middle

line of the perineum, and thus continue and perfect the rotation of the head during parturition.

Velpeau is among the few authors who describe the line of demarcation between the anterior and posterior planes as passing through the extremities of the spines of the ischia. He speaks of these planes as forming four triangles,—two on either side,—their bases being above, and their points tending toward each other below. This, we have no doubt, is correct. (Plate II., Figs. 10 and 11.)

In describing the mechanism of labor, it will be found that the head of the infant descends from the superior strait to the floor of the pelvis very nearly in a straight direction, corresponding to the axis of the superior strait. The top of the head, which was originally parallel to the superior strait, does not materially alter its direction, until it comes into contact with the coccygeal region. It will be found also that the important process termed Extension does not commence until the descent, just mentioned, be nearly completed; indeed, that it cannot occur until the top of the head reaches the perineum, and the sub-occipital region passes under the arch of the pubis. To form, therefore, an accurate idea of the passage of the head through the pelvis, its canal should be studied in two aspects, first, as being cylindrical, and second, as being slightly curved anteriorly.

The *cylindrical* aspect appears in Figs. 5, 6 and 7, on Plate II. The form of the basin of the pelvis has been usually described as conoidal, because the bis-ischiatric diameter is shorter than the bis-iliae. It resembles more an irregular cylinder, slightly contracted above, enlarging toward the inferior portion, and very rapidly contracting toward the coccyx. The head of the infant, after leaving the superior pelvis, passes through a series of parallel planes, until it is arrested at the floor of the pelvis. In reference to practice, three or four of these planes should be carefully studied, namely, one at the superior strait, one at the level of the sub-pubic ligament, one at the level of the spines of the ischia, and also one around the coccyx.

The *First Parallel Plane* (Plate II., Fig. 8) of this cylinder is that of the superior strait, which has been already described. The posterior transverse line in the figure designates the line of separation between the anterior and posterior inclined planes of the pelvis.

The *Second Parallel Plane* is drawn on a level with the sub-pubic ligament, and extends backward to the middle of the second bone of the sacrum. We place the second parallel at this spot because the sacrum, although it runs backward to a slight degree at the superior part, nevertheless, remains almost parallel to the bodies of the pubes. The difference between the



antero-posterior diameter of the first, and that of the second parallel being not more than three lines. Hence, as the child's head descends, it will be directed, owing to this arrangement, in a straight, and not in a curved, line.

A section of the cast on this parallel presents accurately the shape and diameters of this plane. (Plate III., Fig. 12.) The form differs from that of the superior plane chiefly in its posterior portion, where, instead of a concavity, corresponding to the promontory of the sacrum, and the convexities, corresponding to the alæ of this bone, there is nearly a straight line passing from one iliac fossa to the other. The antero-posterior diameter measures four inches and nine lines. The greatest transverse diameter extends from one plane of the ischium to the other, and measures five inches. The posterior transverse line in the figure corresponds to the separation between the anterior and posterior inclined planes, and measures a little less than five inches. The oblique diameter, from the obturator foramen to the sacro-sciatic foramen, is equal to five inches and two lines.

The *Third Parallel Plane* (Plate III., Fig. 13) should be drawn on a level with the spines of the ischia. It will be found extending posteriorly to the lower and most concave portion of the sacrum, and anteriorly to the rami of the ischia, about an inch below the sub-pubic ligament. This location of the third parallel is determined, first, by the fact that here begins a rapid contraction of the cylinder or cavity of the pelvis to its lowest or coccygeal portion; and secondly, because on this level of the spines of the ischia, as will hereafter be shown, the important changes in the direction of the head, termed "Rotation," or "Extension," begin. If such movements had not been previously instituted, they here almost invariably commence, either in an anterior or posterior direction.

The form of this plane is peculiar, being nearly straight behind, across the inferior part of the sacrum, while the lateral margins diverge slightly to the spines of the ischia, at which points they contract. The lateral margins, which correspond to the planes of the ischia and the lower portions of the obturator foramina, become convex, so as to augment the transverse diameter of this parallel, and again contract at the internal edges of the rami of the ischia; while the whole plane is bounded anteriorly by a straight line across the arch of the pubis. The diameters of this section vary from those of the preceding ones. The antero-posterior diameter is four inches and six lines; the greatest transverse diameter is that from one plane of the ischium to the other, and measures four inches and nine lines; while, at the separation of the anterior and

posterior inclined planes, the transverse diameter suddenly contracts to four inches, owing to the encroachment of the spines of the ischia on the cavity of the pelvis. All posterior to this short diameter belongs to the posterior lateral inclined planes; and all anterior to the anterior lateral inclined planes. The oblique diameters of this parallel, from the lower part of the obturator foramina to the superior sacro-sciatic ligaments, measure four inches and nine lines.

Dr. Tyler Smith, who has noticed the importance of this portion of the pelvis, describes the plane as beginning at the middle of the symphysis pubis, and running across the obturator foramen, obliquely to the spines of the ischia. This we think incorrect, for, as we shall hereafter show, the head of the child, in its descent, passes through planes parallel to each other, until its sub-occipital region reaches the sub-pubic ligament. It is here that the obliquities of the planes commence. We perceive no practical reason, therefore, for drawing an oblique plane from the symphysis to the spines of the ischia.

The *Fourth Parallel Plane* (Plate III., Fig. 14) extends around the extremity of the coccyx as a centre, and may therefore be termed the coccygeal plane, the bottom or floor of the pelvis, on which the top of the head impinges during the process of descent in the second period of labor. It is represented by a segment of a circle of one inch and three lines in diameter.

In studying upon the cast, these parallels of the cavity of the pelvis, the relative length of the anterior and posterior lateral inclined planes, and the changes which occur in the direction of these lateral planes, can be exactly seen. At the superior parallel (Plate III., Fig. 19) the posterior inclined planes may be represented by lines drawn from the centre of the promontory of the sacrum to the linea ilia, about nine lines in front of the sacro-iliac symphysis; and the anterior by a line from this point to the symphysis pubis; the former measuring three inches, and the latter four inches.

On the second parallel (Plate III., Fig. 20) these lines posteriorly will converge toward the centre of the second bone of the sacrum, anteriorly to the sub-pubic ligament, and laterally to the anterior margin of the sacro-sciatic foramina; they measure respectively three inches for the posterior, and three and three-quarter inches for the anterior planes.

The third parallel (Plate III., Fig. 21) represents these lines extending from the centre of the fourth bone of the sacrum to the spines of the ischia, and then forward to the rami of the ischia. Being prolonged externally they will meet four inches from the vulva, and thus afford a well-defined idea of the direction of

these inclined planes beyond the arch of the pubis, and the mechanical influence they must exert in determining the oeciput of the child more and more from the sides of the pelvis, toward the central line.

These lines, thus drawn, are the chords of the curves which in obstetric language are called the lateral inclined planes. The posterior are short, and the anterior long, thus forming a regular trapezium; the greatest transverse diameter, being at the spines of the ischia, measures four inches, while that in front, at the rami of the ischia, measures two inches and five lines, and the whole length of the trapezium is eight and three-quarter inches.

The form of the interior of the pelvis will be further illustrated by a *transverse vertical section* (Plate III., Fig. 15) made at the extremities of the spines of the ischia, which form the line of demarcation between the anterior and posterior lateral inclined planes. This section of course crosses the horizontal parallel planes at right angles, and will be found to be about an inch in front of the promontory of the sacrum, and below about three inches in front of the coccyx. The second, third, and fourth horizontal planes are represented in the figure by transverse lines. The form of this vertical section approximates that of a triangle, the base being at the superior strait and the apex below. The sides are irregular, being somewhat convex above, contracting at the spines of the ischia, then again slightly convex and rapidly converging towards the coccyx. The base line is five inches and a quarter in length, and each side of the triangle, as represented by straight lines, measures five inches, and the perpendicular four inches and a half.

The lateral margins of this triangle represent the inclination of the sides of the pelvis posteriorly, and also exhibit the encroachment of the spines of the ischia on the cavity of the pelvis.

An *anterior transverse vertical section* (Plate III., Fig. 16) is drawn about an inch behind the pubis, and through the extremities of the tubers of the ischia. The section presents a quadrilateral face, the superior and inferior sides being nearly parallel, while the lateral margins slightly converge and are somewhat irregular. The upper margin at the superior strait measures four inches and three lines, and the inferior margin, representing the bis-ischiatic diameter of the inferior strait, four inches, while the sides representing the lateral depth of the pelvis measure three inches and six lines. The perpendicular drawn from the plane of the superior to that of the inferior strait, midway from the lateral margins, measures four inches; the transverse line representing the second parallel of the pelvis here measures three inches and nine lines, the third

parallel four inches, and the fourth or coccygeal plane does not appear in this section, terminating behind, nearer to the coccyx.

The form of the cavity of the pelvis will be finally more completely illustrated by an *antero-posterior section* (Plate III., Fig. 17) through the symphysis pubis and promontory of the sacrum. The form of this section, as presented by a cast of the whole interior of the pelvis, is very different from the side view, as presented simply by the bones. The anterior and posterior margins, although irregular, are very similar as to their length and form, each measuring about four and a half inches. The posterior margin follows the irregular curvature of the sacrum, while the anterior margin is first concave, owing to the internal convexity of the body of the pubis, and then convex, as it follows the direction of the rami of the pubis and ischium to the tuberosity; below, the anterior and posterior surfaces converge very rapidly.

The antero-posterior diameters of the four horizontal planes, already described, are represented in the figure.

The greatest depth of this section is four inches and six lines, as measured from its superior to its inferior portion, and is coincident with the axis of the superior strait.

When the student is master of the size and diameters of the child's head, and bears in mind what has now been demonstrated of the form and diameters of the interior of the pelvis, he will perceive, not merely, that the head of the infant can be readily accommodated within this bony canal, but that there is an absolute necessity, if the child be fully developed, that the head must descend in a straight line through the whole depth of the pelvis; that is, the top of the head will be found varying very little from the axis of the superior strait until it reaches the floor of the pelvis. The cervico-bregmatic diameter of the child's head measures three and a half inches, hence, when the top of the head is as low as the coccyx, the base of the cranium will reach above the level of the sub-pubic ligament, that is, above the second parallel or plane. The head, therefore, cannot pass under the arch until its base gets below this parallel; in other words, until the top of the head has begun to depress the coccyx and perineum so as to allow the oeciput to descend.

The irregular cylindrical form of the basin of the pelvis, in the subject covered by the soft tissues, has in front a deficiency, formed by the arch of the pubis, while the bottom, or floor, is closed by the coccyx and perineum; hence, during labor, the head of the child, after reaching the coccygeal region, is arrested in its direct course, and can only escape in an anterior direc-

tion under the pubis. The head, therefore, which at first descended in a straight line, corresponding to the axis of the superior strait, now describes a curve, as represented in Plate III., Fig. 18. The canal, therefore, has been described as being a curved passage, but it is manifest that this curvature is slight, and is confined almost exclusively to the lower portion of the basin.

During the process of descent the head describes a line, at first straight and afterwards bent, extending from the plane of the superior to that of the inferior strait. It enters the pelvis in the direction of the axis of the superior opening, and passing out in the direction of the axis of the inferior outlet. This line has been termed the *axis of the pelvis*. It has been variously delineated by authors, but by no one with sufficient accuracy.

To form a correct idea upon this subject, it must be premised that the head of the child, after descending through the superior portion of the cavity of the pelvis, passes out under the arch of the pubis, and that the sub-occipital region, or nape of the neck, will be found directly under the pubis, where it will be retained pressed against the internal surface of this bone. Hence, the head revolves upon the sub-pubic ligament as on a pivot, when the base of the cranium has descended sufficiently low, that is, when the sinciput has depressed the perineum. It results that as the child's head revolves upon this pivot, it must describe the segment of a circle, beginning not at, or immediately below the superior strait, but at the second parallel or plane, and radii drawn from the sub-pubic ligament, as a centre, to the sacrum and coccyx, will represent the different oblique planes of the pelvis through which the head passes from the second parallel of the cavity to the inferior strait. These radii are shown in Plate III. Fig. 18.

The average length of these radii is four and a half inches, including that of the inferior strait, when the coccyx is extended during labor. Hence, a line drawn from the centre of the superior strait through the centres of the different planes of the pelvis to the inferior strait, will represent the combined axes of these several planes, constituting the true *axis of the pelvis*.

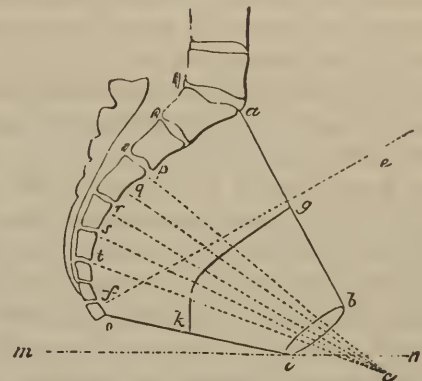
This line runs, therefore, in a straight direction from the first to the second parallel of the pelvis, and then begins to curve until it comes to the centre of the inferior strait.

When obstetric authors speak of the "curved canal of the pelvis," it is evident that this term applies not merely to the bony canal, but to that which is represented by the distended vagina and perineum. It commences in the pelvis; but the great proportion of

what may be termed the "obstetric curve" is exterior to the bony cavity. A description of this curve will be delayed until the vagina and perineum have been described.

If reference be made to the best modern works upon the subject, it will be found that generally these oblique

Fig. 4.



ab. The Plane of the Superior Strait. *oi.* The Plane of the Inferior Strait. *c.* The point where these two planes would meet, if prolonged. *pc, qc, rc, sc, tc.* Planes of the Cavity of the Pelvis. *ef.* The Axis of the Superior Strait. *gk.* The Axis of the Pelvis. *mn.* The horizontal line.

planes are considered as passing toward the body of the pubis, so that if prolonged, they will meet at a common point, in front of this bone. We must believe this to be incorrect, if reference be made to the course of the child's head while traversing the pelvis. Thus the child is said to descend, in the direction of the axis of the superior strait, that is, nearly or quite parallel to its plane; and most of modern authorities, such as MM. Nægelè, Velpeau, Pierre Dubois and Cazeaux, admit that its direction is not materially altered till it reaches the level of the sub-pubic ligament. Below this it begins to deviate, because the subsequent planes become gradually more and more oblique. These planes ought to be represented by lines drawn, not from the pubis, but from the sub-pubic ligament to the sacrum, because the head has already passed all the planes between the pubis and the sacrum. It has still to descend only through the lower half of the pelvis, and, of course, passes perpendicularly through planes, below the top of the arch of the pubis, the sub-occipital region of the head revolving upon the apex of the arch as a centre. If, on the contrary, the planes were correctly represented by lines drawn through the pubis to the sacrum, the head would strike such planes obliquely, and not perpendicularly—that is, not in accordance with the respective axes of such planes.

The truth of this representation will be still further confirmed when the course of the head, through the different planes of the vagina, shall be described.

If the view now presented of the obliquity of the planes of the pelvis be correct, it results that the form of the axis of the pelvis must differ from that usually described by authors, as this axis is a compound of those of the different planes of the pelvis. It runs, therefore, as already described and delineated in Plate III., Fig. 18, in a straight direction through the upper portion of the pelvis, but at the lower portion it describes a regular segment of a circle, the centre of which is at the sub-pubic ligament.

If the child's head should be very large, its central portion during its descent would describe this axis of the pelvis; but when the head is of the ordinary dimensions, it does not so completely fill the basin of the pelvis. Under these circumstances, as is well known, the head is driven more closely against the pubic than the sacral region. As, therefore, the cervico-bregmatic diameter of the head measures about three and a half inches, it follows that, making some allowance for the soft tissues of the child and the parent, the central portion will be about two inches removed from the pubis, during the whole progress of the head through the canal of the pelvis.

To illustrate the relation which the planes of the superior and inferior straits and their axes have with each other and with the axis of the body, the author has prepared the diagram delineated in Plate III., Fig. 23.

Professor Nægelè has paid great attention to this subject, in order to ascertain accurately the inclination of the pelvis. He adopted the plan of measuring the relative height of the sub-pubic ligament and of the extremity of the coccyx, when the woman stood erect. In five hundred individuals of various statures, four hundred and fifty-four had the coccyx elevated above the level of the pubis; in twenty-six it was below, and in twenty it was upon the same level. The mean height of the coccyx above the pubis was about eight lines.

Another plan, adopted by the author, is to regard the line of gravity, when the woman is erect, as representing the axis of the body. This line of gravity, or vertical line, extending from the top of the head to the ground, passes through the lumbar vertebræ, the base of the sacrum and the cavity of the pelvis, a little

anterior to the tubers of the ischia, bisecting a line drawn from one acetabulum to the other. Considering this line, therefore, as fixed, when the individual is perfectly erect, the inclination of the pelvis can be estimated, and it will be found to agree with the observations of M. Nægelè.

In the figure, (Plate III., Fig. 23,) AB represents the axis of the body at right angles, of course, with LF, a horizontal line. DF is the coccy-pubic diameter. CE is the sacro-pubic diameter. DF and CE representing the obliquity of the superior and inferior straits with each other will, if continued in front of the pubis, meet at G. Hence the angle CGD measuring fifty degrees indicates the amount of this obliquity. HL is the axis of the superior strait. KN is the axis of the inferior strait. The angle KND therefore is equal to the angle CGD, and measures fifty degrees.

The angle DFL, measuring ten degrees, indicates the obliquity of the inferior strait with a horizontal line, and hence the height of the coccyx above the level of the sub-pubic ligament is equal to nine lines.

The angle ACE, measuring one hundred and fifty degrees, indicates the obliquity of the superior strait as regards the axis of the body, when the individual is erect. This angle, owing to the flexibility of the lumbar vertebræ, is continually altering during the various motions of the body. When the inclination is forward, the axis of the body approximates the axis of the superior strait, as represented by the anterior dotted lines AC, thus diminishing the obliquity of the superior strait, as represented by the angle ACE. On the contrary, if the body be inclined backward, then the axis of the body will recede from the axis of the superior strait, as represented by the posterior dotted line AC, thus increasing the obliquity of the strait, as represented by the angle ACE.

The obliquity, therefore, of the pelvis, as respects the body, can be altered at pleasure; but the obliquity of the superior and inferior straits, and their respective axes, is unalterable.

The obliquity of the superior strait here given is ninety degrees greater than that given by most authors, as they measure it from a horizontal instead of the vertical line; for example, the angle formed by the intersection of the line CE with the horizontal line LF.

CHAPTER II.

THE SKELETON OF THE FŒTUS.

AFTER this description of the Pelvis and its cavity, it will be useful as well as interesting to notice the form and size of the skeleton of the fœtus, which is wonderfully adapted to the apparent irregularities of the straits and basin of the pelvis.

The skeleton of the child at the full period of utero-gestation usually varies from eighteen to twenty inches in length. Its greatest apparent breadth is across the shoulders, from one acromion process to the opposite; but as these are compressible, its greatest breadth is really from one side of the head to the other. The obstetrician, in studying the skeleton of the fœtus, should remember that, although the bones are described as in the adult, most of them are as yet imperfectly ossified, consisting of different portions connected by cartilage. This is true, not only of the bones of the pelvis, but also of the extremities, the vertebræ, the thorax, and even the head. It should be remarked, also, that even where ossification has taken place, they are comparatively soft, and frequently flexible; the bones of the cranium, for example, bending under pressure, and possessing much elasticity. The immense advantage of this yielding and elastic condition of the bones will readily be perceived. It allows of the compression, and even moulding of the head and body of the child, under the powerful contractions of the uterus in cases of difficult and protracted labor.

Of all portions of the skeleton the head is the least compressible, and its diameters are the largest. Hence, during parturition, the great difficulty is in the transmission of the head: when it passes, the rest of the body readily follows.

THORAX.—It is important to notice that, however compressible may be the body of the child, it has its long and short diameters. The long diameter of the chest, for example, from the apex of one shoulder to the other, the *bis-acromial*, is much longer than the antero-posterior, or *dorso-sternal*: the former often measures four inches, but is easily reducible to three and a half, or even three inches, through the mobility of the scapula; while the latter, drawn from the extremity of the sternum to the spinous processes of the

dorsal vertebræ, measures but three inches, and can be easily reduced to two and a half, owing to the elasticity of the cartilages and ribs.

PELVIS.—The transverse diameter of the hips is longer than the antero-posterior diameter; the former, or *bis-iliac* diameter of the pelvis, does not vary materially whether it is drawn from the crest of the ilium on one side to the opposite, or from one trochanter major of the thigh to the opposite. It measures about three inches. The antero-posterior diameter of the pelvis, from the spine of the sacrum to the pubis, or *sacro-pubic* diameter, measures two and a half inches, and often but two. In practice, however, we generally think of the pelvis with the thighs flexed, as in breech cases; this increases the diameter about half an inch: yet, owing to the size of the nates, and the compressibility of the soft tissues generally, the transverse diameter is still the longer.

HEAD OF THE FŒTUS.—As the head of the fœtus is the most unyielding, and, as its dimensions are greater than those of the thorax, it offers the greatest resistance in delivery, and must therefore be minutely studied in every aspect by the scientific obstetrician, in order to understand how its irregularities can be accommodated to the irregular surfaces of the pelvis, and how it can be most easily transmitted in all the various presentations and positions which may occur in labor. This knowledge, combined with that of the basin of the pelvis, is the true foundation of the science of midwifery.

The general form of the head is ovoid, its greatest transverse diameter existing at the parietal protuberances; its greater extremity is posterior, at the occiput, the small extremity anterior and inferior, at the mentum or chin. From the parietal protuberances posteriorly, the head declines rapidly in every direction, so that the occipital extremity is almost spherical; while anteriorly the converging of the lateral surfaces is more gradual toward the chin. From the parietal protuberances, upward, the declination is also rapid, so as to give a very regular form to the top of the

cranium, while inferiorly to the base the declinature is more gradual, as the parietal protuberances are nearer the summit than the base of the cranium.

The bones of the head, at birth, are named as in the adult. Some of them, however, are divided by cartilage; generally, for example, the os frontis consists of two bones, the sagittal suture extending to the root of the nose, and dividing it into the right and the left portions. Often there is a cartilaginous line transversely across the base of the occiput, and posterior to the great occipital foramen. Even the squamous portions of the temporal bones at birth are connected by cartilage to their more solid portions.

This arrangement, together with the thinness and elasticity of the bones, facilitates greatly the compressibility and sometimes the elongation of the cranium during labor.

This effect is augmented by two other circumstances; the first is, that the different bones of the cranium are merely in contact with each other, having no serrated sutures. They are kept in their relative positions by intervening cartilage, and by the strong membranes of the dura mater and periosteum; hence these connections, aptly termed "*commissures*," allow a certain degree of mobility to the bones of the cranium, and even the elevation of one bone over the other. These sutures or commissures are named as in the adult; hence we speak of the *lambdoidal* or *occipito-parietal*, of the *sagittal* or *bi-parietal*, of the *squamous* or *temporo-parietal*, of the *coronal* or *fronto-parietal*. In addition we have in the fœtus a continuation of the bi-parietal suture through the os frontis to the nose, and therefore called the *bi-frontal* suture or commissure.

The second circumstance which contributes to the compressibility of the cranium is a deficiency in the ossification of portions of the bones, so that spaces exist, occupied only by cartilage between the periosteum and the dura mater. These "openings" are termed *fontanels*. They are not only of great importance in increasing the mobility of the bones of the cranium, but also in facilitating the diagnosis of the various presentations of the head in labor. The size, form and angles of these fontanels, with the number and direction of the commissures extending from them, must be carefully studied, in order to determine the presentation and position of the head, as an accurate diagnosis is often of the utmost importance.

The Anterior or Superior Fontanel or Bregma (Plate IV., Fig. 28) is situated on the top of the head or sinciput, extending from the apex of the cranium forward one or even two inches in some subjects. It is a trapezium in form. It has two short or posterior sides, formed by deficiencies of the anterior superior angles

of the parietal bones. The anterior sides are longer, and formed by deficiencies of the posterior superior angles of the two bones of the os frontis. These sides are often prolonged some distance along the bi-frontal commissure, increasing the size of the fontanel, and the acuteness of the anterior angle. The sides of this fontanel are not perfectly straight, being convex toward the centre of the opening. Hence the angles are a little prolonged. The two lateral angles, formed by the frontal and parietal bones on either side, are acute and equal to each other. The posterior angle formed by the parietal bones is obtuse, and the anterior angle formed by the bones of the os frontis, is long and of course very acute.

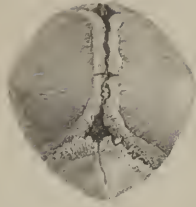
The anterior fontanel, from its great size, its peculiar form, its four angles, and the four sutures extending from the angles, can very often be recognized during parturition. It always indicates the upper and anterior portion of the cranium; and, by noticing the direction of the acute or obtuse angle, the practitioner can determine the position of the face or occiput of the child, indeed, of the whole head.

The Posterior Superior Fontanel (Plate IV., Fig. 25) is much smaller, and of a triangular shape, situated at the posterior extremity of the bi-parietal commissure, at its junction with the occipito-parietal. The base of the triangle is formed by a deficiency of the superior angle of the os occipitis; it is slightly curved, and runs transversely. The sides of the triangle are formed by the deficiencies of the posterior superior angles of the parietal bones; they are also somewhat convex. The two lateral angles are therefore formed by the occipital and the parietal bones, while the superior angle is formed by the parietal bones. From each of these angles may be traced the bi-parietal and the two branches of the occipito-parietal sutures.

It can be easily recognized by its small size, its triangular shape, and by its three sutures. It is, however, often very small, and in a great number of instances does not exist, owing to the ossification of the bones having been complete. Nevertheless this portion of the child's head can be readily recognized by tracing the occipito-parietal suture from the mastoid portion of the temporal bone to its junction with its fellow and with the bi-parietal. At this point will be felt an acute angle, formed by the posterior margins of the parietal bones, which are almost universally elevated above the level of the occipital bone, and the three sutures will be found radiating from this point. All this is distinctive, and indicates precisely a presentation of the posterior superior portion of the child's head.

Cazeaux, Velpeau and others, mention instances in which this fontanel was quadrangular, owing to a pro-

Fig 25.



Occipital Extremity

Fig 26

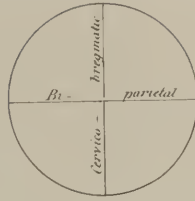
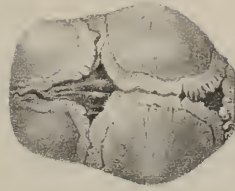


Fig 28



Top of the Head

Fig 29.

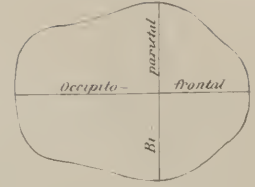


Fig. 27



Mental Extremity.

Fig 24.

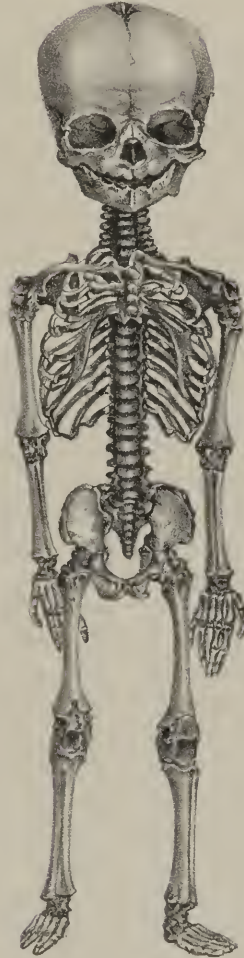
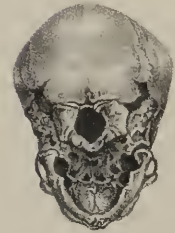
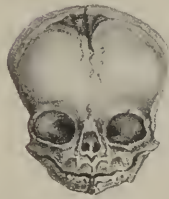


Fig. 30.



Base of the Head

Fig. 33.



Region of Os Frontis

Fig 31.

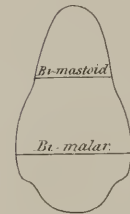


Fig 34.

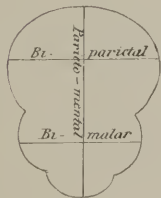


Fig 32.

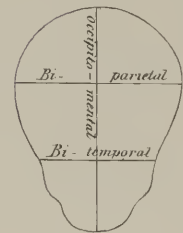


Fig 35.

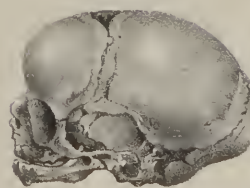


Face.

Fig 36.



Fig 37.



Side of the Head

Fig 38



longation of the bi-parietal suture through the upper portion of the occipital bone. Such instances are very rare, and there can be no difficulty in recognizing the posterior fontanel by its small size, and the oblique direction of its sutures.

There are four other fontanels frequently to be found in the cranium, but they are of very minor importance. Two are the *anterior lateral* at the terminations of the bi-frontal commissure, where it meets with the sphenoid bone. They are small, irregular in form, and so covered by the temporal muscle and other tissues as not to be recognized during labor. The two *posterior lateral* fontanels (Plate IV., Fig. 37) are of more importance. They are situated at the lower termination of the occipito-parietal commissure above the mastoid portions of the temporal bone. They are small, very irregular in their form, and should not be confounded with the posterior superior fontanel, from which they can be very readily distinguished.

Other fontanels can occasionally be recognized in the cranium, when ossification is tardy, and in immature fœtuses. Hence, authors speak particularly of large spaces or fontanels in the bi-parietal or bi-frontal commissures. These ought not to deceive the practitioner, especially as in cases of imperfect organization the usual fontanels are large and distinct.

The sutures, the fontanels, the thinness and the flexibility of the bones, have been alluded to as regards the upper portion of the head; all the inferior portion, usually described by anatomists as the face and base of the head, are remarkably firm and unyielding. A line drawn from the superior orbital processes of the eye over the root of the zygomatic arch, to the great occipital protuberance, will divide the compressible from the incompressible portions of the head. All above this line, comprising the arch or vault of the cranium, is compressible, and all below incompressible; this is a fact of great importance to be remembered in difficult labors.

Planes or Surfaces of the Head.—During the process of delivery, almost any portion of the surface of the child's head may "*present*," that is, may be felt toward the centre of the pelvis. The character and facility of the labor must vary according to the form and size of the different surfaces or regions which may be thus perceived at the centre of the orifice of the uterus. Sometimes the labor may be comparatively very easy, while in other instances it may be difficult, dangerous, and occasionally impracticable, owing simply to the presentation of different surfaces of the head.

For practical purposes we think no less than eight surfaces should be described; although many classical

authors confine their descriptions to two or three of these regions.¹ The child descends usually in cases of natural labor, presenting its occipital extremity or region. In other instances, as in pelvic presentations, the mental extremity or chin will descend first into the cavity of the pelvis. We may have also presentations of the sinciput or top of the head, and reversely, the base of the cranium. In some rare cases, there may be presentations of the right or left side of the head. All practitioners recognize also, as distinct from the others, presentations of the face; and we have no doubt that an eighth presentation, that of the os frontis, differing from either the sinciput or the face, should be recognized, as giving rise to some dangerous and fatal cases of labor.

Occipital Extremity (Plate IV., Fig. 25.)—In all the most favorable cases of labor, the large extremity of the ovoid descends first into the cavity of the pelvis, and should therefore be carefully studied for the purposes of understanding minutely the process of delivery in cases of natural labor, so that the practitioner may be prepared to detect any deviation from a proper presentation, and to afford the requisite assistance in cases of difficulty. In estimating the boundaries of the *occipital region or great extremity of the head*, four points may be taken; one on either side, at the extremity of each parietal protuberance, the third at the posterior margin of the anterior fontanel, the apex of the head, and the fourth at a point in the base of the occiput, midway between the great occipital protuberance and the occipital foramen, corresponding to "the nape of the neck." A line drawn over these four points, describes a circumference bounding this extremity, and may be called, therefore, the cervico-bregmatic circum-

¹Professor Nægèlè, of Heidelberg, has been the great innovator on the subject of presentations of the fœtus, and has been followed very universally in his arrangement by the accoucheurs on the Continent of Europe and Great Britain. While we readily accord to Madame Lachapelle, to Nægèlè, and others, great credit for simplifying the arrangements of Baudelocque, and thus rendering both the study and practice of obstetrics more intelligible, we must believe that this simplification has been carried too far. The idea of reducing all presentations of the head to those of the cranium and those of the face, cannot be supported either theoretically or practically. Indeed, most authors, while adopting this division in words, are obliged to neglect it when describing the presentations of the cranium, and the treatment which they demand. They continually speak, for example, of deviated positions of the cranium or of the vertex from that which is normal, as demanding special attention. As experience proves that many of these deviations are not only productive of delays and increased sufferings, but also that they remain persistent, and thus involve the welfare and even the life of the infant and its mother, we conceive it far better to examine in detail each of the so-called deviated presentations, in order that the complications thus resulting may be well understood and scientifically treated.

ference. A section of the head corresponding to this circle would present us with a plane surface, constituting the plane of this circumference. (Plate IV., Fig. 26.)

The anatomical points included are large portions of the parietal and occipital bones, the occipito-parietal and bi-parietal sutures, and the posterior fontanel.

It is very common to speak of the presentation of this great extremity of the head under the denomination of the presentation of the *vertex*, or "crown of the head." This is an unfortunate circumstance, as it has given rise to much confusion in describing the mechanism of labor. As this word is, however, so commonly employed, a definition of it is given, to obviate, as far as possible, the confusion which exists as to what is meant by the vertex. Its original meaning, doubtless, refers to the top or apex of the head. In Dr. Dunglison's Dictionary it is thus defined. In obstetrics, however, it is usually regarded as representing the posterior portion of the top of the head, or what is termed the "crown," the point whence the hair radiates. If the leg of a compass be fixed at the apex of the triangle of the posterior fontanel, and a radius be taken extending from this point to the great occipital protuberance, a circle may be described, which will include the superior portion of the occipital, and the posterior angles of the parietal bones, and will cross the middle of the bi-parietal suture. The space thus included is the proper vertex. The vertex forms, therefore, the upper and anterior portion of the great occipital extremity of the head. The anterior segment of the vertex is usually felt at the commencement of the second stage of labor, when the head is imperfectly flexed; but as the flexion increases, the central portion of the vertex, that is, the posterior fontanel, approximates more and more toward the centre of the pelvis.

As we speak of the circumference of the great extremity of the head, we must also speak of its diameters, which are all-important in estimating the facility or difficulty of the transit of the head through the cavity of the pelvis. The length of the diameters of the fœtal head varies exceedingly in different children. In reference, however, to the diameters of the canal of the pelvis, as already described, the following may be regarded as maintaining the relative proportion usually found between the size of the head and the cavity of the pelvis.

A line drawn from one parietal protuberance to the other, is termed the transverse or *bi-parietal* diameter, and measures *three and a half* inches. (Plate IV., Fig. 26.) Another line drawn from the posterior margin of the anterior fontanel to a point midway between the occipital protuberance and the occipital foramen, measures also *three and a half* inches. It is best known

by the name of *cervico-bregmatic* diameter, as designating the points through which it passes; it is often termed the occipito-bregmatic, or sub-occipito-bregmatic diameter. It is also very frequently termed the perpendicular diameter, as falling from the top of the head to the base. This, however, is not correct, for it runs obliquely; a perpendicular line from the apex of the head, would fall on the great occipital foramen. (Plate IV., Fig. 38.)

These diameters are usually termed the short diameters of the head, as distinguished from those which represent the length of the cranium. The circumference over the extremities of these diameters measures about ten inches and a half.

The Mental or Small Extremity of the Head (Plate IV., Fig. 27) is concerned in pelvic presentations. When the chin presents in labor, the whole head descends like a wedge into the cavity of the pelvis. We have, therefore, first the chin, followed by the face, the os frontis, and the sides of the head. The diameters gradually increase till we reach the great parietal protuberance laterally, the top or apex of the head anteriorly, and the nape of the neck posteriorly. It is manifest that we have again the same circumference, (Plate IV., Fig. 26,) and of course the same diameters of the head as in presentations of the great occipital extremity, namely, the *bi-parietal* and the *cervico-bregmatic* diameters. The head, therefore, so far as its diameters and circumferences are concerned, must pass through the straits and canal of the pelvis with as much facility, in cases of presentation of the chin, as in presentations of the occiput. The great importance of bearing this fact in mind, in all the varieties of pelvic deliveries, will be hereafter fully illustrated.

The Top of the Head, or Sinciput, (Plate IV., Fig. 28,) may be regarded as bounded by the occipital protuberance behind, by the most prominent portion of the forehead in front, and laterally by the parietal protuberances. A line drawn over these points will separate the superior from the inferior portions of the cranium. This is often termed the horizontal circumference of the head. The section made in this direction presents us with a plane of an ovoid shape. (Plate IV., Fig. 29.) The greatest transverse diameter is the *bi-parietal*, and measures *three and a half* inches. An anterior transverse diameter from one side of the os frontis to the other, termed bi-temporal, measures two and a half inches. A line drawn from the occipital protuberance to the os frontis, the longitudinal or the *occipito-frontal* diameter, measures *four* inches. The whole horizontal circumference over the points designated, measures twelve inches.

The anatomical points of this superior region include

all the upper portions of the two divisions of the os frontis, and of the parietal bones above the protuberance, with the upper triangular portion of the occipital bone. It is divided by the bi-parietal and bi-frontal suture, while anteriorly is to be observed the fronto-parietal and posteriorly the occipito-parietal sutures. Toward the occipital portion we again recognize the posterior superior fontanel; while toward the frontal region and near the top of the head, we have the anterior fontanel. Hence we often speak of the presentation of the anterior fontanel as synonymous with the presentation of the sinciput or top of the child's head. It represents this surface, although the apex of the head is at its posterior margin, the fontanel being in front of the central point.

The Inferior Region or Base of the Head (Plate IV., Fig. 30) presents at the straits of the pelvis, in cases of pelvic deliveries, where extension has occurred to a great degree, that is, where the chin has departed from the breast. The "base," in anatomical language, (Plate IV., Fig. 31,) is bounded by the chin anteriorly, and the occipital protuberance posteriorly, presenting a long diameter of four and a half inches, an anterior transverse or *bi-malar* diameter of *two and a half* inches, and a posterior transverse or *bi-mastoid* diameter measuring *two* inches. In obstetric science, however, the base must be regarded as much more extensive (Plate IV., Fig. 32); as the head descends obliquely, the long diameter of the base will extend from the chin to the posterior fontanel or occiput, the *occipito-mental* or oblique diameter of the head, measuring at least *five* inches. It is the longest diameter of the head. Laterally the plane of the base must be considered as extending along the sides of the head to the parietal protuberances, where we have again the longest transverse diameter, the *bi-parietal* measuring *three and a half* inches. The circumference over the extremities of these diameters, therefore, passes over the inferior maxillary bones, squamous portions of the temporal bones, and over the parietal protuberances to the superior point of the occiput. The circumference measures thirteen and a half inches. The anatomical points of the base will be easily recognized, especially the inferior maxillary bone, and the inferior portions of the sphenoid, temporal and occipital bones.

It is, however, interesting and important to remark, that at the central portion of the base is the great occipital foramen for the transmission of the medulla oblongata to the spinal canal. The articulating surfaces for the junction with the atlas favor flexion and extension or the ginglymoid action of the head; while the motion of rotation is effected entirely by the other cervical vertebræ, but especially by the junction of the

atlas with the axis. The degree of this rotation, owing to the flexibility of the bones and ligaments of the neck, is very great in the fœtus at "term." There is no doubt that the degree of rotation extends to a quarter of a circle; indeed, in many instances, we have reason to believe that this rotation may be carried to a still further degree with impunity, when gradually effected, in cases of difficult labor.

The spinal column thus attached to the central portion of the base may be considered as a fulcrum, on which the child's head flexes and extends. The head, therefore, may be regarded as a lever, the anterior arm of which extends to the chin, and the posterior to the occiput; the flexion or extension of the child's head in labor depends upon the degree of force or resistance which is applied to the anterior or posterior portions of the head. When the force is greater upon the anterior portion of the head, flexion ensues; when upon the posterior, extension occurs. It is well known, however, that in the child there is a greater disposition to flexion than to extension. This may arise from two causes: the first is owing to the greater weight of the bones of the face, as compared with those of the occiput, and the second, to the fact that the usual position of the child's head in utero is a state of semi-flexion; hence, when any force is applied, owing to the expelling powers operating through the medium of the spine, it will be directed toward the posterior portion of the head, and thus cause the descent of the occiput and the approximation of the chin to the breast of the child; in other words, it will increase the flexion existing at the commencement of labor. Practically, therefore, the anterior portion of the head may be regarded as the long arm of the lever, and the posterior the short arm.

It often happens, however, in retarded pelvic deliveries, that extension is partial; so that, instead of the whole base of the head presenting, there is, in reality, merely a presentation of the *base of the cranium*; that is, of the os frontis on the one side, and of the occipital protuberance on the opposite. We have the *occipito-frontal* diameter, measuring but *four* inches, instead of the occipito-mental diameter, as in the preceding case. There is also involved the *bi-parietal* diameter, measuring *three and a half* inches. The circumference over these diameters will pass over the os frontis, the sides of the head, and the parietal and occipital protuberances; it is, in reality, the same circumference and plane which belongs to the top of the head. (Plate IV., Fig. 29.) This distinction between the base of the whole head and the base of the cranium is of considerable practical importance.

The Region of the Os Frontis (Plate IV., Fig. 33) will be found to present, in some instances, at the com-

menement of labor. This has not usually been noticed by authors, being dismissed under the general designation of brow or face presentations, into which they may be resolved; but the author having, in practice, met with several instances where such presentations were persistent, and some in which there were fatal results to the child and the parent, it seems important to point out the distinctive characters of the *Frontal Region*. If the top of the forehead be toward the centre of the pelvis, the chin will be at one side, and the middle portion of the bi-parietal suture will be upon the opposite side. Hence, the chin, the two parietal protuberances, and a point about an inch posterior to the anterior fontanel, will be the extremities of the diameters of this region. We have, therefore, the *bi-parietal* diameter, (Plate IV., Fig. 34,) and one extending from the parietal bones to the chin, and may, therefore, be called the *parieto-mental* diameter of the child's head, and measures *four and a half* inches. The circumference of this region will, therefore, pass over the chin, sides of the face and temples, and over the parietal protuberances, to the top of the head, and will measure twelve and a half inches. The section of its plane is an irregular ovoid, the central portion of which is the top of the forehead. The anatomical points to be noticed are the face and all that portion of the sinciput or superior part of the head anterior to the parietal protuberances; including, of course, the anterior superior fontanel, and portions of the four sutures proceeding from its angles.

The *Face or Facial Region* (Plate IV., Fig. 35) presents in some cases of labor, where the head is in the greatest degree of extension. The anatomist bounds the superior part of the face by the edges of the orbits; but the obstetrician carries this boundary to the highest portion of the forehead. The anatomical points, therefore, concerned in face presentations, include the whole anterior surface of the os frontis, as well as the anterior portions of the bones of the face, where, of course, we have the mouth, cheeks, eyes, and the central prominence of the nose. The diameters of the face, (Plate IV., Fig. 36,) therefore, extend from a point in the bi-frontal suture at the top of the forehead, to the lower extremity of the chin, and also from the extreme portions of the malar bones on either side; the former, or perpendicular diameter of the face, is termed the *fronto-mental* diameter, and measures *three* inches; the latter, or transverse diameter, is called the *bi-malar*, and measures *two and a half* inches, although the fatty condition of the cheeks make it, apparently, three inches. It should be remembered that the fronto-mental is the long diameter of the face. The plane of the face, therefore, with its circumference over the chin, malar bones,

and top of the forehead, may be regarded as ovoid in form. The central portion of the face is at the termination of the bi-frontal diameter, where it meets the nasal bones; from this point there is one and a half inches to the top of the forehead above, and one and a half inches below, to the extremity of the chin.

In studying, however, the mechanism of delivery in face presentations, the real difficulty in the transit of the head will be met in the passage of the cranium. The chief resistance, therefore, may be expected at a surface extending from the front part of the neck over the parietal protuberance to the top of the cranium; presenting, therefore, the real plane concerned in facial presentations. The diameters of this plane extend from one parietal protuberance to the other, constituting the bi-parietal diameter, and also from the posterior margin of the anterior fontanel to the front or tracheal region of the neck. The latter, extending from the top to the base of the cranium, has been termed vertical, but not correctly, for it is somewhat oblique when the head is in a horizontal direction. It has been more accurately designated as the *trachelo-bregmatic*, (Plate IV., Fig. 38,) to distinguish it from the cervico-bregmatic diameter, which extends from the top of the head to the nape of the neck, and is often termed the perpendicular diameter. This trachelo-bregmatic diameter measures at least *three and a half* inches. The whole of this trachelo-bregmatic circumference or plane measures about ten and a half inches. It appears that although the face is apparently small, the real resistance will be similar to that presented by the great occipital extremity of the head.

The *two Lateral Regions of the Head* (Plate IV., Fig. 37) are still more rarely met with in labor. The side of the head, of course, extends from the great occipital protuberance to the chin, and from the top of the head to the base, including, therefore, the lateral portion of the face, os frontis, squamous and mastoid portions of the temporal bone, the whole of one parietal bone, and half of the occipital bone. The circumference, therefore, passes over the chin, the apex of the forehead, the top of the head, the occipital protuberance measuring thirteen and a half inches. Of course it includes many of the diameters already described, especially the *occipito-mental*, or longest diameter of the head; the *parieto-mental*; the *occipito-frontal*, or long diameter of the cranium; and the *cervico* and *trachelo-bregmatic* diameters. Another passing from the base of the occiput, as represented by the nape of the neck, to the apex of the forehead, is termed the *cervico-frontal* diameter. It measures nearly *four* inches. In labor, however, owing to the depression of the os frontis, and other circumstances, it is easily reduced to

less than three and a half inches in length. The plane of these lateral regions is represented by a perpendicular section of the head, and is of an irregular ovoid shape, intersected by the various diameters to which allusion has been made. (Plate IV., Fig. 38.)

This may be termed the vertical circumference of the occipito-mental diameter, and must be distinguished from the oblique circumference of the occipito-mental diameter already described as concerned in presentations of the base of the head.

The lengths of the various diameters of the regions just described cannot, of course, be received as positive or fixed, inasmuch as they vary in different children, even from the same parent. They are also modified by the sex of the child. It is said by Clark, and others, that the head of the male infant is one-twenty-eighth to one-thirtieth larger than that of the female head. Hence, that labors with males are more painful and tedious, more frequently fatal to the child, or even to the mother, than labors with female children. This assertion, however, must be received with much limitation, as girls are often of enormous size at the time of delivery, and boys frequently the reverse. The

heaviest foetus at term which has occurred in the practice of the author was a girl. Moreover, practically, the assertion is of no importance, as the sex of the child can seldom be determined prior to delivery.

These eight regions, or surfaces, are more numerous than those usually described by authors; but as each of them may be occasionally met with in practice, it becomes the well-instructed obstetrician to understand the relative proportions of these different regions one with another. The wonderful adaptation of the head to the canal of the pelvis in facilitating delivery in all cases of practicable labor, and the causes why, in some instances, labor is protracted, or even impracticable, in consequence of mal-presentations of the head, will be elucidated when we study the mechanism of labor. An attempt will also be made to point out the almost mathematical exactness with which the diameters of the head correspond to the various diameters and axes of the straits and canal of the pelvis. This study will amply repay the student, not only by displaying the adaptation of means to the end during the process of parturition, but also by preparing him to afford the necessary assistance in cases of protracted and difficult labor.

CHAPTER III.

TISSUES AND ORGANS OF THE PELVIS.

MUSCULAR AND FIBROUS TISSUES.—To complete our idea of the obstetric pelvis, all the tissues which cover the interior of the bones, close its outlet, and form the general cavity of the abdomen, must be taken into consideration. The obstetric student will therefore bear in mind the boundaries of the abdominal cavity, especially the concave muscular diaphragm constituting the division between the thorax and abdomen; also the lower portions of the thorax and the abdominal muscles, fasciæ, etc., which form the sides, the anterior and even a large part of the posterior walls of the abdomen, and the spinal column, completing the cavity posteriorly and projecting so as to form an imperfect partition between the right and the left sides. In the superior portion of this cavity we should recognize the solid viscera, the liver, and the spleen occupying the concavity of the diaphragm, while the stomach and intestines, soft and distensible tissues, occupy nearly all the

remaining portions of the abdomen, dipping down even into the cavity of the pelvis.

The superior pelvis, as formed by the ilia and lumbar vertebræ, and completed by the abdominal walls anteriorly, may be considered as representing the section of a cone, the base superior, with a truncated apex corresponding to the superior strait. The anterior and lateral surfaces are therefore convergent toward the inferior pelvis. The whole of the superior pelvis forms the lower part of the abdomen, and is admirably adapted for the accommodation of the uterus and the foetus during the latter periods of utero-gestation. The concavity of the iliac fossæ is not essentially altered by the muscles covering its surface. The iliacus internus muscle on either side occupying the fossa of the ilium, and descending over the lower rounded margin below the anterior inferior spinous process, is very thin, and does not materially diminish the concavity.

The *psœ* muscles, rising from the sides of the dorsal and lumbar vertebrae, in pursuing their course to join the iliac muscles under Poupart's ligament, project over the lower margin of the iliac bones above the *linea ilia*, and being rounded and thick, diminish somewhat the iliac fossa, but not sufficiently to lessen, in an appreciable degree, the accommodations provided for the uterus in the superior pelvis. They encroach also inwardly on the superior strait, diminishing the bis-iliac diameter in the living subject to the extent of six or nine lines. The form of the superior strait is rendered more triangular, so that the oblique diameters become the longest, more readily accommodating the child's head than the transverse diameter. In severe labors, however, these muscles often yield to the pressure of the head, so as to allow it to assume a transverse position.

The cavity of the pelvis is, in a great portion of its extent, also covered with muscular tissue, so arranged, however, as not to interfere materially with the size of the canal and the length of its diameters. The obturator foramen, for example, is not only occupied by its fascia, but also through its whole extent, by a muscle so thin as not to project beyond the level of the bones, and which sends off a tendon, passing over the ramus of the ischium, through the inferior sacro-sciatic foramen. Posteriorly the great sacro-sciatic foramina are occupied by blood-vessels, nerves, areolar and adipose tissues, and also by the pyriform muscles. These muscles having their origin at the inferior posterior spinous process of the ilium, and from the edges of the sacrum, where they are involved with the fibres of the ligaments, run obliquely out of the pelvis to the great trochanters of the thigh. These tissues, while filling up the foramina at the posterior parts of the pelvis, do not really encroach upon its cavity. There are two other thin muscles, termed *coccygeal*, arising on either side of the spinous process of the ischia; their fibres diverge and run somewhat obliquely to the sides and the extremity of the *os coccygis*; they are intimately involved with the sacro-sciatic ligaments, and have a tendency to draw the *os coccygis* forward, but do not encroach in any degree upon the cavity of the pelvis.

It is all-important for the obstetric student to study the various tissues which form the outlet or bottom of the pelvis. The whole of the inferior strait of the pelvis, with the exception of the orifices of the vagina and rectum, may be considered as filled up with soft tissues. In addition to the skin externally, there are large quantities of elastic fibrous tissues, abundantly interspersed with adipose matter, situated at the opening of the body, and usually described under the gene-

ral denomination of the *perineum*, extending from one tuberosity of the ischia to the other, and from the posterior sacro-sciatic ligaments and coccyx toward the pubis. That portion between the *os vaginae* and the anus, extending an inch and a half, may be termed the anterior perineum, or often emphatically the perineum, while all that is behind the anus is called the posterior perineum. The distensibility and elasticity of these tissues are familiar to every accoucheur, and are often enormous.

The anatomist describes four muscles embedded in the perineum, the sphincters of the vagina and rectum, and the two *transversi perinei* muscles. The two latter arise from the tubers of the ischia, and run to the middle line of the perineum.

Fig. 5.



MUSCLES OF THE PERINEUM.—1. Tuber Ischia. 2. Sphincter Vaginae. 3. Its origin from the base of the Clitoris. 4. Vaginal Ring of the same muscle, which receives a part of the fibres of Levator Ani. 5. Intercrossing of the Sphincter Vaginae and Sphincter Ani at the Perineal Centre. 6. Erector Clitoridis. 7. Clitoris covered by its Prepuce. 8. Transversus Perinei. 9. Sphincter Ani. 10. Levator Ani. 11. Gracilis. 12. Adductor Magnus. 13. Posterior part of Gluteus Magnus.

The sphincter ani, or circular muscle of the rectum, has a connection with the extremity of the coccyx and the sides of the rectum; and its columns, after separating to surround the anus, again meet at the median line to unite with the tendons of the *transversi* muscles, and also with the lower portions of the sphincter vaginae muscle. This latter muscle occupies the sides of the orifice of the vagina, extending from the rami of the pubes and ischia to the middle line of the perineum, the fibres being stronger and more numerous above, and weaker and less numerous below: it acts as an imperfect constrictor to the orifice of the vagina, while the action of the sphincter ani muscle is perfect as a constrictor. These muscles, although

important in many respects, oppose a very slight impediment to the process of delivery.

There are, however, two muscles of considerable size and extent which, coming from the sides of the pelvis, and descending to the rectum, constitute the true muscular floor of the pelvis, and often, from their rigidity, present a serious obstacle to the progress of the child. They are termed *levator ani muscles*, but might be appropriately termed *levatores perinei*, as acting upon all the tissues at the outlet of the pelvis. It becomes, therefore, interesting and important to study the origin, direction and insertion of these muscles. The levator ani muscle arises as far forward as the body of the pubis, and also from the descending ramus. The superior edge can then be traced on a level with the upper margin of the obturator foramen, and thence, in a circular direction, across the plane of the ischium to its spinous process. Its origin is from the pubis, anteriorly, and the spine of the ischium, posteriorly, while the intermediate portion arises between the two laminae of the descending pelvic fascia, extending from the body of the pubis across the plane of the ischium: this muscle is therefore covered both internally and externally by a layer of this fascia. From this extensive origin the fibres converge downward and inward toward the rectum; the posterior fibres are inserted into the extremity of the coccyx, and the raphe of the posterior perineum. The middle fibres are also inserted in the same perineal line, and are covered with the sphincter ani muscles. More anterior portions of the muscle descend upon the sides of the vagina to its under surface, and are there intimately connected with the sphincter vaginae and sphincter ani.

It is manifest from this extensive origin, and the direction and insertion of their fibres, that the levatores ani close the whole of the inferior outlet of the pelvis, with the exception of the os vaginae and anus. By the contraction of these muscles, the whole perineum, both anterior and posterior, as well as the viscera of the pelvis, may be drawn upward; and of course, when in action, they will resist the descent of the viscera, resting upon their inner surface.

During the descent of the child, in labor, the presenting part impinges against this muscular floor, pushing it downward and forward, and greatly distending all the tissues of the outlet before delivery can occur. The rigidity of these muscles often afford great obstacles to the progress of the child: indeed their relaxation is absolutely necessary for its easy delivery.

It is important also to remark that these muscles correspond with wonderful precision to what we have termed the anterior inclined planes of the pelvis, ex-

tending from the symphysis pubis to the spines of the ischia. They are therefore a continuation or prolongation of the lateral inclined planes of the pelvis from the bones, as a basis, down to the middle line or raphe of the perineum. The effect, given by these inclined planes to the rotation and other movements of the child's head during its descent, is continued and augmented by these muscles until the process of rotation is complete. It is not right, however, to maintain, that the whole effect upon the head is owing to the muscular and other tissues of the perineum; the rotatory motion is commenced by the bones constituting the sides of the pelvis, and they give the proper direction and influence to the tissues now described at the outlet of the pelvis. All these tissues are soft and distensible to a very great degree, and are capable of enormous distension and prolongation during the process of labor, when the tissues are pressed upon by the fœtus. A similar distension of the posterior portion of the perineum takes place, so that the concave surface of the sacrum and coccyx may be considered as prolonged, as far as the inferior commissure of the vulva.

THE ORGANS OF GENERATION.

These organs are exterior and interior; the mons veneris, the labia majora, the clitoris with its prepuce, the nymphæ or labia minora, the vestibulum, the orifice of the vagina, the anterior and posterior perineæ, separated by the anus, constitute the external portions; while internally are the uterus, with its ligaments, the Fallopian tubes, the ovaries, the vagina with its hymen, the bladder, and the rectum.

Without going into details, we shall content ourselves with a general description of these important organs, chiefly in reference to the processes of gestation and parturition.

EXTERNAL ORGANS.—The obstetric student, in examining the parts exterior to the pelvis, will notice that the mons veneris is "sur-pubic," that is, above the tuberosity of the pubis; that all below this to the orifice of the urethra is in front of the symphysis pubis; while the orifice of the vagina, with the orifice of the urethra upon its anterior margin, is directly under the sub-pubic ligament, occupying the superior portion of the arch of the pubis, and of course a portion of the anterior surface of the pelvis. The orifice of the vagina is separated from the anus by the anterior perineum, which is about one inch or one inch and a half in length. The posterior perineum, from the coccyx to the anus, measures about two inches—the orifice of the rectum

being nearly central, between the pubis and the coccyx, in a natural or quiescent condition of the tissues.

The external labia extend from the mons veneris to the perineum, being prominent and convex above, and gradually tapering to their termination on the lateral portion of the vagina. Hence, during delivery, they are not much unfolded; but their inferior portions are pressed away in a lateral direction. They are bounded superiorly by the pubic, and inferiorly by the perineal commissures. Below there is a thin duplicate of skin called also the *frænum perinei* or *fourchette*; it is very generally ruptured in the first labor. The whole of this space between the labia is termed the *vulva*, and in the virgin measures about two and a half inches. The lower portion of the posterior commissure to the sub-pubic ligament is the orifice of the vagina, measuring about one inch. The orifice of the urethra is at the upper or anterior edge of the vagina close to the arch of the pubis, and at the base of the vestibulum, or triangular space extending between the nymphæ to the glans clitoridis which is situated about the middle of the symphysis pubis. The nymphæ run in an oblique direction downward toward the rami of the pubis, terminating a little below the level of the orifice of the urethra, at about the middle of the sides of the vagina. They are not unfolded during the process of delivery.

It may be remarked, that these nymphæ are often very much enlarged and elongated, assuming generally a triangular form, and projecting between the labia externally. In obstetric operations, in cases where such deformities exist, care should be taken that they be not torn or otherwise injured.

Fig. 6.



Section of the Pelvis.

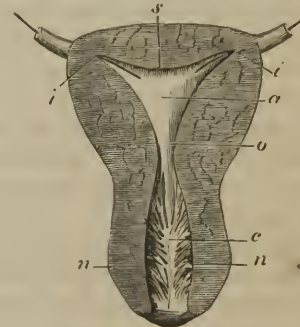
THE INTERNAL ORGANS.—The *uterus*, or proper organ of gestation, will be found located between the

pubis and the sacrum. It is an irregular, conical body, flattened on the anterior and posterior surfaces, while its base or fundus is rounded: its apex is truncated, constituting its lower extremity, while the fundus is superior. The posterior surface is more convex than the anterior. The whole length of the unimpregnated uterus is about two and a half inches, and it measures one and a half inches at its greatest breadth, and one inch from the anterior to the posterior surface.

The uterus is divided into two portions; one, superior, termed the “body of the uterus;” the other, inferior, termed its “neck,” or “cervix.” The former is somewhat triangular, the base being above, and measures about one inch and a quarter from the fundus to the cervix. The neck, in the virgin female, is somewhat conical or “acuminated,” tapering from above downward, and slightly flattened on the anterior and posterior surfaces; in women who have had children, the shape is more like that of a flattened cylinder. It measures also about one or one and a quarter inches in length. Its extremity is elliptical, and about six lines in its transverse diameter, and four lines in the conjugate. The orifice in the virgin is almost circular; but in women who have had children, it is elliptical, its extremities extending often toward the edges of the cervix. The anterior lip is the longer, but more narrow than the posterior, which is broader and shorter. The vagina is reflected on to the cervix about three lines from the edge of the anterior lip, and about six or eight lines from the edge of the posterior lip; this last apparently, therefore, projects more into this tube.

A transverse incision from one side of the uterus to the other, and extending from the fundus to the os,

Fig. 7.

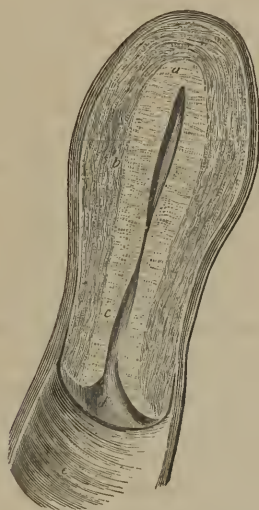


TRANSVERSE SECTION OF THE VIRGIN UTERUS.—a. The Cavity of the Body. c. The Cavity of the Neck. ii. The Orifices of the Fallopian Tubes. n. The “Arbor Vitæ.” o. The Os Uteri Internum. s. The Superior Border of the Cavity of the Body.

exhibits two cavities, communicating one with the other. The superior one is that of the body of the

uterus, and is of a triangular form—two sides are lateral, and one superior and transverse. They are not perfectly straight, but in the unimpregnated condition each is convex internally, and measures about one inch in length. Of the three angles, the inferior is at the superior extremity of the cervix; it is pervious, and forms the communication between the cavity of the body and that of the neck; it is called the “os uteri internum;” it is somewhat contracted, and, in the living subject, very sensitive. The two superior angles of the cavity of the uterus communicate with the Fallopian tubes, with which they are continuous; they are very small, and are situated at the superior horns or cornua of the uterus. The

Fig. 8.



ANTERO-POSTERIOR SECTION OF THE UTERUS.—*a*. The Fundus. *b*. The Body. *c*. The Neck. *d*. The Os Uteri Externum. *e*. The Vagina.

anterior and posterior surfaces of this cavity are in contact; hence, an incision from the anterior to the posterior surface of the uterus, exhibits a mere line of demarcation between these two surfaces.

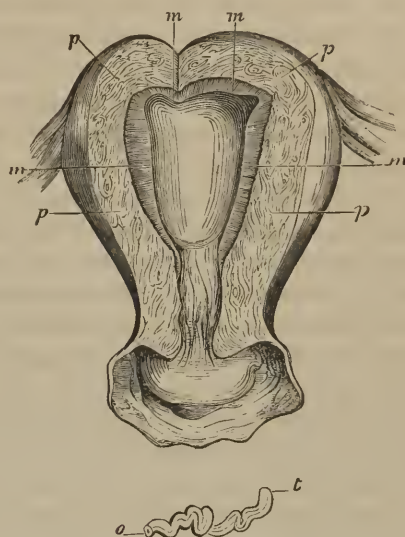
The cavity of the neck is barrel-shaped, being contracted at each extremity, and convex in the middle; nevertheless, it is also somewhat flattened, so that an antero-posterior incision exhibits very little space in this direction; while transversely, its greatest diameter is about four lines. It communicates above with the cavity of the uterus by the os uteri internum, and with the vagina below by the os uteri externum.

Both of these cavities are lined by a delicate mucous membrane, reflected from the vagina internally to the Fallopian tubes, into which it passes. This lining membrane in the neck of the uterus is thrown into folds, having an arborescent arrangement, consisting of a longitudinal eminence or trunk, with oblique branches on either side; it is termed the “arbor vitæ,” and is

abundantly supplied with mucous glands or follicles, which secrete a tenacious mucus in the unimpregnated condition, and a gelatinous matter during pregnancy.

In the cavity of the body of the uterus, the mucous membrane is comparatively smooth. It has a ciliated columnar epithelium, and a large number of glands. These are generally simple tubes, somewhat tortuous in their course.

Fig. 9.



MUSCULAR AND MUCOUS COATS OF THE UTERUS.—*mm*. The Mucous Membrane. *ot*. One of the Glands of the Mucous Membrane. *pp*. Muscular Tissue of the Uterus.

The exterior of the uterus is, for the most part, covered by the peritoneum, between which and the mucous membrane, is the proper tissue or parenchyma of the organ. This is very dense and firm, being rather more dense in the cervix than in the body of the uterus. Much discussion has existed as to the nature of this tissue; but there seems to be no doubt, at the present day, that it is muscular, of the non-striated variety. In the unimpregnated condition, it can, with difficulty, be demonstrated. Hence, some insist that these fibres are merely rudimentary; but that they truly exist in the virgin state, is proved by the contractions, neuralgic spasms, etc., which are often observed in dysmenorrhœa, and in other cases of uterine irritation. During pregnancy, these fibres are developed, and some degree of regularity can be traced in their arrangement, as will be hereafter mentioned.

The arteries of the uterus come from two sources; one set from the aorta or renal arteries, and they are termed the spermatic or ovarian arteries; they descend between the laminae of the broad ligaments, and are distributed to the ovaries, Fallopian tubes, and the superior portions of the uterus. The other source is

from the hypogastric or internal iliac arteries; they are larger, and approximate the uterus between the broad ligaments at its inferior part, on either side, and are freely distributed to the whole organ. The veins accompanying these arteries, both ovarian and uterine, return the blood to the vena cava, or to the internal iliac veins.

The nerves of the uterus have been very minutely investigated by modern anatomists. Dr. Robert Lee has distinguished himself in these investigations. The nerves coming chiefly from the great hypogastric plexuses of the ganglionic system are distributed most minutely to every part of the uterus: although some have doubts whether the vaginal portion of the cervix is supplied with nerves; but, as it is well known that the extremity of the cervix is endowed with great organic and animal sensibility, there seems no reason to question that it is abundantly supplied with nervous filaments. The uterus, through the medium of the nerves, is most intimately associated with the whole ganglionic and also with the cerebro-spinal nervous systems.

The *vulvo-uterine canal, or vagina*, extends from the vulva to the cervix uteri, being about five inches in length, and pursuing a curved course corresponding to that of the rectum, and not in the direction of the axis of the inferior strait of the pelvis. The external orifice is nearly circular, or somewhat elliptical; its long diameter, measuring about an inch, extends from the sub-pubic ligament to the posterior commissure of the vulva. About half an inch within, there is, in virgins, an imperfect membranous partition, between the internal and the external portions of the vagina;—it is termed the “hymen,” and extends from the posterior and lateral portions of the orifice toward the urethra in front, where there is a small lunated opening, concave toward the pubis. The space between the frænum perinei and the hymen is slightly depressed, and is termed the “fossa navicularis.” The hymen is formed of two delicate membranes, with a fine intervening fibrous tissue, said by some to be muscular. The whole tissue is exceedingly sensitive. After being ruptured, it disappears almost entirely. Small eminences, termed “*carunculæ myrtiformes*,” are usually observed in married women.

In the anterior part of the opening of the vagina, is the orifice of the *urethra*, which is situated directly under and close to the arch of the pubis. Its position can be detected by passing the finger in front of the pubis along the vestibulum to its base, where a small depression can be recognized, with a little projection or caruncle at its lower part. The under surface of the urethra projects into the vagina, owing to the thickness

of its sub-mucous or fibrous tissue. Hence, the course of the urethra, which extends in women about an inch and a half or two inches to the bladder, can be recognized by this prominence. The direction of the urethra, when the woman is supine, is nearly horizontal, but inclined somewhat upward. Hence, in the erect position, it approximates a vertical line. The lining membrane of the orifice of the vagina is similar to that of the vulva.

The vaginal tube from the hymen to the uterus resembles a flattened cone, with the anterior and posterior surfaces in contact in a quiescent condition. The internal or mucous coat is abundantly supplied with glands: below it is loosely attached, but after it is reflected upon the cervix it is thinner and very closely adherent. The superior portions of this membrane are smooth, but the inferior portions are more or less rugose. This rugosity is observed underneath the urethra, where it is well marked and decided, and also posteriorly in front of the rectum. It assumes an arborescent arrangement, having a central prominence and ramifications passing off obliquely. The projection of the dense tissue of the under portion of the urethra, covered, as it is, with this arborescent arrangement of the mucous membrane, is often observed, especially in women who have borne children, filling up the orifice of the vagina; and, hence, it has been termed the “*valva vaginæ*,” and not unfrequently, when engorged with blood, has been mistaken for some preternatural growth or tumor. The middle coat is chiefly muscular, being continuous with the muscular fibres of the uterus. The evidences of its contractility, during life, are not very decided, as the tube is very distensible, and seldom manifests any active contraction. Nevertheless, upon examination by the speculum, it evidently contracts over the extremity of this instrument as it is removed; and the practitioner, in many operations, in cases of irritable vagina, will be conscious of even spasmodic contractions of this passage. In women who have had children, such manifestations are very rare. By fibrous tissue the upper third of the posterior portion of the vagina is connected with the peritoneum; the remaining portion is bound to the rectum, except at the extremity, where it is connected with the dense tissue, constituting the anterior perineum; anteriorly, the vagina is connected with the urethra for a short distance, and then with the lower portion of the bladder and cervix uteri.

Intimately involved with this fibrous tissue, is the *plexus retiformis*, or vascular net-work of blood-vessels. This is chiefly perceived at the lower extremity of the vagina, and gives an erectile character to the whole tissue.

The vagina is abundantly supplied with nerves, especially at its lower extremity, where there is a remarkable and peculiar sensibility. This vulvo-uterine canal, although possessing slight contractility, is nevertheless very extensible, in every direction, as is most remarkably exemplified in the process of labor.

The *bladder* is located behind the body of the pubis and in front of the uterus, resting upon the anterior portion of the vagina. It is very loosely connected to the pubis, by areolar tissue, but adheres more closely to the anterior part of the cervix uteri. The connection of the lower part of the bladder with the anterior wall of the vagina is very intimate. Its most dependent portion or neck terminates in the *urethra*, which has been already noticed.

The structure of the mucous, muscular, and fibrous coats are similar to those of the male subject. The ureters, descending from the kidneys into the pelvis, pass between the laminae of the broad ligaments to the sides of the vagina, and penetrate, obliquely, the coats of the bladder on either side of the middle line.

The *rectum* descends over the left ala of the sacrum, to the concavity of this bone, taking its position on the left of the median line. At the floor of the pelvis it is in contact with the posterior wall of the vagina until it is separated from it by the anterior perineum. This lower extremity of the rectum is midway between the coccyx and the pubis. It has its proper sphincter, which, as already mentioned, is intimately associated with the levatores ani, and other muscles of the perineum.

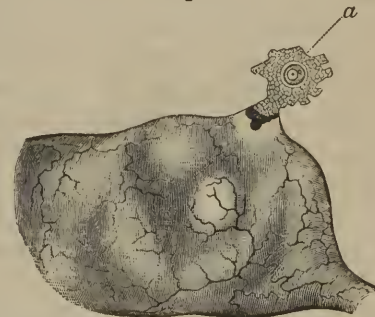
The obstetric student should notice that the organs described are covered more or less completely by fascia. These *pelvic fasciæ* are continuations of the fascia iliaca, and of the fascia transversalis of the abdomen, and are intimately connected with the tendons of the psoas parvus muscle. From the brim of the pelvis this fascia descends to the level of the obturator foramina, where it divides into two laminae, receiving the levatores ani muscles between them. The exterior lamina descends upon the lower surfaces of these muscles to be lost in the tissues of the perineum, while the internal lamina, after covering the levatores muscles, is reflected to the vagina, cervix uteri, etc. These pelvic fasciæ posteriorly cover the great sacro-sciatic foramina, and descend to the lower portion of the sacrum and coccyx.

The *ovaries* are two flattened bodies, situated on the posterior part of the broad ligaments, about an inch and a half from the uterus on either side. Their length is an inch and a quarter, their width is about nine lines, and their thickness five lines. Their posterior margin is convex; their anterior margin, by which they are

attached to the broad ligaments, and through which their blood-vessels pass, is nearly straight. They have a peritoneal coat reflected from the posterior lamina of the broad ligament. The inner extremity of each ovary is attached to the side of the uterus by a solid fibrous cord, termed the ligament of the ovary.

Under the peritoneal coat is the tunica albuginea, a fibrous envelope so dense as to give form to the ovary. From the inner surface of this coat there are numerous prolongations of fibrous bands, in the interstices of which will be found a large number of small bodies, which give a soft spongy character to the whole tissue during childhood. These are the rudiments of the Graafian vesicles or ovisacs. Toward the age of puberty they are greatly developed, especially those near the surface of the ovary. These vesicles containing the ovum, arrive in succession at maturity, becoming more or less prominent upon the surface of the ovary. A perfectly mature vesicle often measures from three to six lines in diameter. Its fibrous and serous coverings are greatly thinned, they become more vascular, and its fluid contents continuing to accumulate, it even-

Fig. 10.



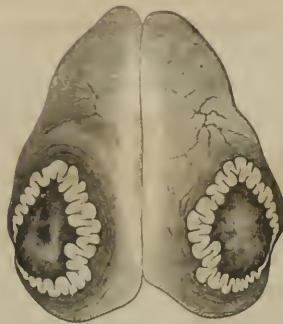
Ovary with Graafian follicle ruptured; at *a*, egg just discharged with a portion of the membrana granulosa. (After Dalton.)

tually ruptures. According to most physiologists, this rupture takes place periodically, at the time of menstruation; it seems, however, reasonable to suppose that the thin membranes of this enlarged vesicle may break at other times under the influence of sexual excitement. The ovum, with a portion of the fluid contents of the vesicle, escapes into the cavity of the peritoneum in some few cases, but more frequently the ovum passes into the Fallopian tube. This deposit in the tube has been called oviposition.

After the escape of the ovum, the ovisac, although diminished in size, is large, owing to the effusion of blood into its cavity. This blood coagulates while the lining membrane is thrown into folds and gradually thickens. The whole tissue thus becomes firm and dense; it gradually augments in size, while the color, by the end of three weeks, becomes tawny or yellow-

ish, hence it is called a *corpus luteum*. Dr. Dalton maintains, that at the end of three weeks it measures

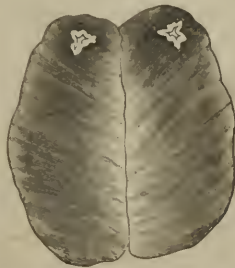
Fig. 11.



Ovary cut open, showing Corpus Luteum divided longitudinally, three weeks after menstruation; from a girl dead of hæmoptysis. (After Dalton.)

three-quarters of an inch in length by half an inch in depth, and at this period there is no difference between the corpus luteum of the unimpregnated and pregnant woman. Others, however, have described the virgin corpus luteum as much smaller, and sometimes hardly perceptible. Dr. Dalton declares that in

Fig. 12.



Ovary, showing Corpus Luteum nine weeks after menstruation; from a girl dead of tubercular meningitis. (After Dalton.)

the virgin, after the third week, this body diminishes in size, and usually disappears by the seventh or

Fig. 13.



Corpus Luteum of pregnancy, at end of second month; from a woman dead from induced abortion. (After Dalton.)

eighth week, a small cicatrix alone indicating its former position.

In the pregnant woman the corpus luteum continues to be developed even to the fifth or six month of utero-

Fig. 14.



Corpus Luteum of pregnancy, at end of fourth month; from a woman dead by poison. (After Dalton.)

gestation, when it may measure seven-eighths of an inch in length by three-quarters of an inch in depth; its membranes, and also the enclosed coagulum of blood, owing to the absorption of its watery parts, become more dense. In the centre of this coagulum there is always found, according to some authors, an irregular or stellated cavity containing a little fluid. This cavity has been therefore regarded as characteristic of pregnancy.

Dr. Dalton, however, asserts that its presence is incidental, and that there is really no essential difference between the corpus luteum of the pregnant and of the unimpregnated woman, except that during pregnancy this body continues to increase for a much longer time, its coats become more thickened and dense, and its

Fig. 15.



Corpus Luteum of pregnancy, at term; from a woman dead in delivery from rupture of the uterus. (After Dalton.)

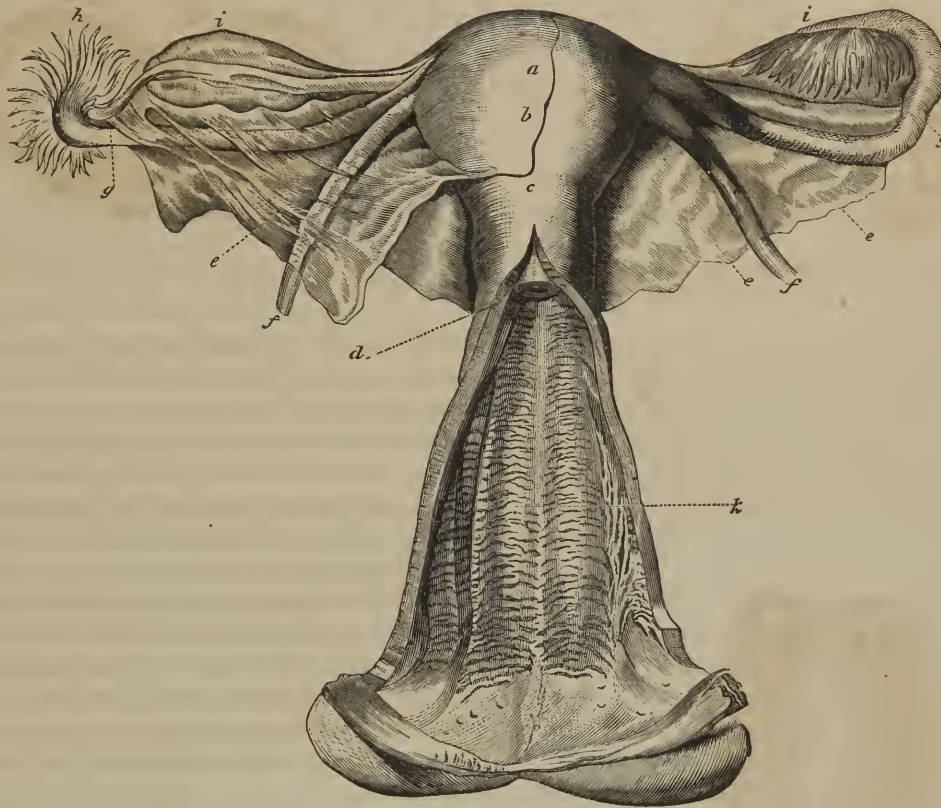
declinature, which does not begin till the latter periods of pregnancy, is comparatively slow, not being perfected till eight or nine weeks after delivery, and sometimes even for a longer period.

From the superior horns of the uterus, the *Fallopian tubes*, or *oviducts*, pass off in a lateral direction;

their course is at first nearly straight, but afterward tortuous; and their outer extremities are turned downward, on the posterior portion of the broad ligaments. They are about four inches in length and tubular, covered externally by the peritoneum, and internally

by a mucous membrane reflected through small orifices at the upper cornua of the uterus, and continued to the outer or peritoneal extremities. Their outer orifices are comparatively large, fimbriated, or fringe-like, and open directly on the surface of the perito-

Fig. 16.



UTERUS AND ITS APPENDAGES.—*a*. Fundus of the Uterus. *b*. Body of the Uterus. *c*. Neck of the Uterus. *d*. Mouth of the Uterus. *ee*. Broad Ligaments. *ff*. Round Ligaments. *gg*. Fallopian Tubes. *h*. Fimbriated Extremity of the right Fallopian Tube. *ii*. Ovaries. *k*. Vagina.

neum, constituting the only example in the economy of an external or mucous tissue being continuous with an internal or serous membrane. The middle coat is very universally described as muscular, continuous with the muscular fibres of the uterus, and thus these tubes are capable of a peristaltic motion. M. Robin, however, as reported by Cazeaux, denies the muscular character of these oviducts, stating that they are simply fibrous, and that they penetrate directly the uterine tissue, from which they may be distinguished by their color, being whitish, while that of the uterus is reddish-gray.

The outer or peritoneal extremity has one of its fimbriæ, or a fibrous line at its inner margin, connecting it with the outer extremity of the ovary. In the quiescent condition of the organs, there seems to be no other connection of this fimbriated extremity and its orifice with the ovary; and the ovary

has no medium of communication directly with the uterus.

The Fallopian tubes, however, are abundantly supplied with blood-vessels, and are therefore capable, from the character of their tissues, of erection under certain states of animal excitement. During this erection, and owing to the peculiar arrangement of the loose extremity of the tubes, the whole fimbriated surface or extremity is brought over the surface of the ovary, according to the opinion of almost all anatomists and physiologists. Hence, it is under such circumstances alone, that there can be any communication between the Fallopian tube and the uterus upon the one hand, and the vesicles of the ovaries on the other. The erection, therefore, is essentially requisite for the germ vesicles to escape from the ovisac into the Fallopian tube.

The *peritoneum*, which lines the cavity of the abdo-

men, covers portions of the viscera of the pelvis. It spreads over the superior and posterior portions of the bladder, it is then reflected to the anterior surface of the uterus, and laterally, so as to form the anterior lamina of the broad ligaments. It then passes over the fundus uteri and the Fallopian tubes, covering the posterior portion of the uterus, and forming the posterior lamina of the broad ligaments. It descends from the uterus to the upper portion of the vagina, and then is reflected to the rectum and the posterior portions of the pelvis. Two duplicates of this reflection, extending from either side of the neck of the uterus to the sides of the rectum, and eventually to the sacrum, constitute the utero-sacral ligaments, while two analogous duplicates extend from the edges of the uterus anteriorly to the sides of the bladder, and are termed the utero-vesical ligaments.

It should be remarked, that there is a "cul-de-sac" or pocket of the peritoneum formed between the sacrum posteriorly, the neck of the uterus anteriorly, and the divergent utero-sacral ligaments laterally; in the posterior portion of this pocket or sac is perceived the rectum a little to the left side, and on the anterior portion, in addition to the cervix of the uterus, there is one-third of the upper portion of the vagina, covered by the peritoneum. This anatomical fact it is of importance to remember in all diseases and operations, whether in the impregnated or unimpregnated condition.

The whole floor of the pelvis, therefore, when the small intestines are removed, presents a peritoneal surface, divided into two portions by the uterus and broad ligaments extended from one side to the other, having the bladder in the anterior portion, immediately behind the pubis, and the rectum in the posterior portion.

The proper situation of the uterus in the cavity of the pelvis ought to be clearly understood. Located between the pubis and the sacrum, its anterior and posterior surfaces may be regarded as parallel respectively to these bones; while the top or fundus of the uterus, which is slightly below the sacro-pubic diameter of the superior strait, points toward the linea alba, and the os uteri is directed toward the coccyx. Being thus parallel to the pubis and sacrum, it necessarily partakes of the obliquity of the pelvis; its long axis from the fundus to the os uteri being coincident with that of the superior strait. Hence, when the patient is erect, the uterus is very oblique, the fundus projecting forward, and the os uteri backward. When the patient is supine, the direction of the uterus approaches a vertical line.

This *obliquity* of the womb is maintained by the joint co-operation of all its ligaments, assisted by the pressure of the intestines. Thus, the broad liga-

ments which pass from the edges of the uterus, have an oblique attachment near the anterior margins of the great sacro-sciatic foramina, in the direction of the line which separates the anterior from the posterior lateral inclined planes of the pelvis. By means of the utero-sacral ligaments, passing from the sides of the cervix to the sacrum, the lower extremity of the uterus is retained posteriorly; while the fundus of the uterus is maintained near the bladder and pubis, not merely by the utero-vesical ligaments, but also by the ligamenta rotunda, or round ligaments. These ligaments, which are now regarded as continuations of the muscular tissue of the uterus, pass off on either side of this organ, just below the Fallopian tubes. They run between the laminae of the broad ligaments, obliquely forward and upward, to the internal abdominal ring, through the inguinal canal and external abdominal ring, to the mons veneris, where their fibres interlace with each other and with the tendinous fibres of the external oblique muscle.

It is manifest, therefore, that the joint operation of all these ligaments, is to maintain the uterus in its relative position between the pubis and the sacrum, in the ever varying movements of the woman.

These supports of the uterus are, however, extensible, and some possess also a contractile power, not simply from their elasticity, but also from muscular fibres. Hence, they allow much motion to the uterus, especially in an antero-posterior direction. If the bladder be distended, the whole body of the uterus is pushed backward; if this viscus be empty, and the rectum distended, the uterus will be pushed forward; the contractility of its supports contributing to re-adjust the organ when, from any cause, its central position has been disturbed.

The small intestines sink into the pelvis, anteriorly to the broad ligaments, and also posteriorly, where there is more space for their accommodation. Hence, when the patient is erect, or any straining effort is made, these intestines form a barrier, both anteriorly and posteriorly, so as to prevent any disposition for the fundus uteri to incline either toward the pubis or sacrum. The pressure of the intestines, therefore, maintains the obliquity of the uterus, and its proper location in the central portions of the pelvis.

THE OBSTETRIC CANAL.

After this review of the tissues and organs of the pelvis, a correct idea may be formed of what is termed the *obstetric canal*. (Plate V., Fig. 39.)

The vagina, during gestation, becomes gradually much developed; but during labor it is distended to a most remarkable degree. In every case of delivery it

is dilated sufficiently to contain the whole head of the child, and very often a large portion of its body. Its parietes are firmly pressed against the sides of the pelvis, while its superior extremity rises with the neck of the uterus toward the brim, and its external opening is protruded by the head of the child downward and forward; so that a canal, which in the unimpregnated condition measures about four inches in length, is elongated to ten or twelve inches during labor. The posterior wall of this distended vagina, extending from the promontory of the sacrum to the frænum perinei, measures about eleven inches, as estimated by M. P. F. Dubois. Anteriorly from the neck of the uterus to the sub-pubic ligament its elongation is comparatively trifling. The vagina, thus enlarged, constitutes the proper obstetric canal described by the child during delivery. It is too frequently denominated the canal of the pelvis, inasmuch as during labor, a major portion of this canal is distended externally.

The axis of the pelvis, as already described, extending to the inferior strait, is therefore continued in the same circular direction to the middle of the orifice of the distended vagina. If the point of a compass be fixed at the bottom of the symphysis pubis, with a radius of two inches, it will describe an arc of a circle which will represent the inferior part of the axis of the bony cavity. The same circular movement continued forward to the centre of the orifice of the vagina would complete the whole axis of the obstetric canal, or the course which the child's head describes, during its descent from the superior strait at the commencement of labor, to its final exit at the orifice of the vagina, when this process is terminated.

As represented in the diagram, (Plate V., Fig. 39,) the head of the child descends very nearly in a straight direction parallel to the axis of the superior strait, until the top of the head reaches the bottom or coccygeal region of the pelvis; then the base of the occiput, rotation being accomplished, gets under the arch of the pubis, and extension commencing, the head describes a circular curve on the sub-pubic ligament, as its centre or fulcrum, until it is completely delivered. Thus, it passes successively the various planes of the whole obstetric canal. These planes are parallel to each other from that of the superior strait to that of the sub-pubic ligament; they then gradually become more and more oblique to the inferior strait. This obliquity of the planes continues to augment, as represented in the diagram, to the orifice of the vagina, the plane of which presents a very obtuse angle to that of the superior strait.

It is manifest that the size of the lower portion of this obstetric canal exterior to the coccy-pubic diameter depends, during labor, upon that of the child's

head, by which it is distended under the bearing-down efforts of the mother. Of course, it varies in different labors, according to the greater or less development of the cranium. Hence, the distance of the central portion of the head from the sub-pubic ligament is continually varying, and, of course, the axis of this canal, as represented by the distended vagina, from the os uteri, at the superior strait, to the os vaginæ externally, will be occasionally nearer, and sometimes at a greater distance from the pubis. This fact should be remembered, although it does not in any degree alter the direction of the axis of the pelvis, which axis, as here described, is straight at the upper portion, and then describes a regular segment of a circle, until delivery be completed.

Few authors have noticed the straight character of the axis of the superior part of the pelvis; it has, however, been thus described by Nægèlè, Pierre Dubois, Cazeaux, and others of the highest authority. We must believe that it is equally true that the lower portion of the axis should be represented by a segment of a regular circle, being described by the centre of the cranium, as the head revolves upon the sub-pubic ligament, as a pivot, during the process of extension.

Those who are interested upon this point may examine the various descriptions given by authors, especially by Prof. Nægèlè, of the planes and axes of the pelvis. To us they seem to be founded, not so much upon the actual course described by the head, during its transit, as upon the ideal views as to the form and dimensions of the bony canal. Hence we find, as represented in Fig. 4, on page 29, that the lines which represent the oblique planes of the pelvis are drawn from the concave surface of the sacrum and coccyx through the bone of the pubis, to meet at a common angle in front of this bone. However correct this may be, as a description of the bony cavity of the pelvis, it is certainly very incorrect as regards the course described by the head of the child, which must descend perpendicularly to the plane of the superior strait and those below it, until the sub-occipital region of the head reaches the level of the sub-pubic ligament. The "curve of Carus," the distinguished Professor of Dresden, although by many in this country regarded as true, seems to us very erroneous. He takes a radius equal to two and a quarter inches, and describes a circle around the middle of the posterior margin of the pubis as a centre. This gives a curved line as the axis of the pelvis from the superior strait, instead of acknowledging its straight character until it reaches the level of the sub-pubic ligament, as maintained by Nægèlè and Dubois. Moreover, when continued through the whole obstetric canal, it would, beneath the arch of the pubis, approximate too near the symphysis.

CHAPTER IV.

GESTATION.

THE student having made himself familiar with all the peculiarities of the obstetric pelvis, will be prepared for investigating the important and wonderful changes consequent upon impregnation. To enter fully upon this subject, he must study all that has been developed on the mysterious function of reproduction, or generation. Physiologists have well established that in the mammalia, this generative function comprehends three distinct series of phenomena: first, *germination*; second, *fecundation*; third, *gestation*.

Germination is the formation of organic cells, or molecules, termed *germs*. Each sex forms its own germ; that in the male is supposed to exist in the spermatozoids, observed in the fluid secreted by the testicles; that of the female in the germinal spot of the ovum contained in the Graafian vesicles of the ovary.

Fecundation consists in these respective germs from the male and female meeting each other, when, in consequence of a mutual action or reaction, or positive union with each other, a new or compound vesicle is produced. The new vesicle is endowed with those mysterious vital powers which give it a separate existence from its parents, and by which it is gradually evolved and developed from this rudimentary imperfect formation, through all the stages of foetal existence, to that of the perfect child; and after birth these developments, from the same inherent powers, are manifested in all the changes of its physical, animal, intellectual, and spiritual condition, during the whole period of its existence. These developments are well known to be characteristic of its parentage; but, wonderful as it may be, all the influences exerted on the offspring by either the father or the mother are entirely through the media of the microscopic germs which meet in the act of fecundation. Physiologists have not yet positively determined the locality of fecundation, whether it occurs always in the ovaries, in the Fallopian tubes, or in the uterus, or whether it may occasionally occur in one, and sometimes in another of these locations.

Leaving the consideration of these acts of reproduction, some more detailed notice must be given of ges-

tation or pregnancy, by which is meant the retention and carrying of the product of fecundation to the full term of foetal life, when the new being is prepared for another mode of existence.

Gestation in the human female may be divided into two general heads: natural and preternatural pregnancy—the one regular, the other irregular, normal and abnormal. In the former the ovule passes down the Fallopian tube, or oviduct, into the cavity of the uterus, there to be developed. In the latter, it does not reach the cavity of the uterus, but may be developed in the walls or the parietes of the uterus, in the tube, in the ovary, or in the cavity of the peritoneum; in all of which it must eventually perish: but cases are upon record in which it has lived even for nine months after conception in these unnatural positions. These regular and irregular gestations are, therefore, usually denominated *uterine* and *extra-uterine* pregnancy.

NATURAL, OR UTERINE PREGNANCY.

The nervous and vascular excitements, and the consequent congestion and erection of the generative system produced by coitus and fecundation, seem to be kept up by the formation and presence of the new being. As this embryo is continually making demands upon the tissues of the parent for the materials for nourishment, it necessitates a determination of blood to the uterine system; the demand for which must increase, as the embryo is gradually developed to the full period of utero-gestation. The consequences must be that changes are continually ensuing in the condition of the uterus and its appendages, during the presence of the foetus in the cavity of this organ. These changes in the uterus and its contents, and the effects thereby produced upon the animal economy, constitute the phenomena or symptoms of pregnancy. These phenomena, therefore, embrace first, the developments of the uterus; second, the developments of the ovum, with its contents, the embryo, etc.; and, third, the changes, in the female economy, which are usually called the signs of pregnancy.

DEVELOPMENT OF THE UTERUS.—The *volume* of the uterus increases, after fecundation, with more or less regularity from the beginning to the end of gestation. Hence, the uterus, although measuring originally but three inches in its long diameter at the commencement of pregnancy, at the end of the fourth month measures in the same diameter, five inches, and at the full period of gestation twelve or thirteen inches. Its transverse diameter, from one Fallopian tube to the opposite, is extended at term to nine or nine and a half inches, and the antero-posterior diameter to eight inches.

The *form* or *shape* of the uterus changes, so that the flattened character of the anterior and posterior surfaces soon alters, becoming more convex; but the posterior surface of the uterus is developed more rapidly than the anterior. Hence, there is not only a greater degree of convexity posteriorly, but the broad ligaments are thus brought nearer to the anterior surface of the uterus. Toward the middle of utero-gestation, the body of the uterus is more spherical, with the neck, however, still dependent. At the full period it is again ovoidal, the base being at the fundus, and the truncated apex at the vagina. At "term," the circumference of the uterus at the Fallopian tubes, says Velpeau, measures some twenty-six inches, while at the cervix it is not more than thirteen inches.

The cavity of the neck of the uterus is greatly developed at its superior opening, so as to augment that of the body of the uterus. Usually a small portion of the extremity of the cervix projects into the vagina; but sometimes, however, no vestige of the neck can be felt, the whole lower surface of the uterus presenting a regular spheroid surface, with a dimple or spot marking the orifice of the uterus.

Much has been written of the changes in the consistency and form of the neck of the uterus. The importance of these changes has been over-estimated, as they differ exceedingly in different subjects, or even in the same woman in different pregnancies. It is, however, generally true that the density of the cervix diminishes after impregnation; it becomes softer, and of course larger in all its dimensions, especially in its breadth and length. The neck, at the end of the third or fourth month, is said to measure an inch and a half, or, according to Madame Boivin, sometimes two inches in length. M. Cazeaux, however, denies that there is any increase whatever in the length of the neck. By the fourth month of utero-gestation the upper portion of the neck is said to be broader, owing to the dilatation or enlargement of the internal os uteri, of course with a diminution in the length of the neck, sometimes to the extent of one-fourth. At the end of six months,

owing to the same development of the upper opening of the cervix, the length is sometimes diminished to one-half; a still further diminution occurs, in ever varying proportions, until the full period.

The above account of the shortening of the neck of the uterus at successive stages of gestation, has been generally received as true, but certainly, in practice, it cannot be depended upon as a means of diagnosis; indeed, Stoltz and Cazeaux deny that any such shortening occurs prior to the last month of utero-gestation. In primiparous patients Cazeaux contends that the neck becomes softer and wider, the internal and the external os remaining contracted, so that a bulging occurs in the middle of the cervix, giving a "spindle-like shape" to the neck. There may be, he says, a little shortening from this cause, the internal undilated os somewhat approximating the external os. In multiparous patients, however, the process is different: the softening begins from below upward, so that the external os uteri becomes patulous, and can often admit the finger to a greater or less distance, according to the stage of pregnancy, and it is not until the eighth and a half month that the softening and consequent dilatation of the internal os uteri is perceptible, after which period it enlarges, so that the membranes and sometimes the presenting part of the child may be touched. Now, the neck of the uterus rapidly shortens, so that merely the os tincæ projects into the vagina, while the presenting part of the child subtends the inferior segment of the uterus, and can usually be perceived through its walls. We acknowledge that our observation, in most instances, confirms the experience of M. Cazeaux; and we have for years placed but little confidence in the length of the neck of the uterus as diagnostic of the stage of pregnancy.

The form of the uterus, although altered during pregnancy in the manner already detailed, is subject to various modifications, arising from the presence of two or more children in utero, the presentation or position of the fœtus, the greater or less quantity of the liquor amnii, the location of the placenta, and the pressure of the surrounding tissues. It is said, for example, by some, that an indentation on the posterior surface is frequently perceived arising from the pressure of the lumbar vertebræ. The form of the uterus also, from the thinness of its walls, is often temporarily changed by the motions of the body and limbs of the fœtus. Irregular projections from this cause can often be felt, and are sometimes even visible during the latter parts of utero-gestation.

Corresponding changes occur in the cavity of the body of the uterus. Hence, very soon after impregnation, the anterior and posterior surfaces separate from

each other; the sides of the cavity, instead of being convex internally, become flattened and then concave, so that the interior of the uterus, instead of being triangular, becomes ovoid. About the middle of gestation it approximates the sphere, and at the latter periods it again becomes conoidal, the lower extremity, or apex of the cone, being prolonged by the development of the os uteri internum, and of the cavity of the cervix.

The *position* of the uterus is necessarily changed in pregnancy; for, as the size increases, it becomes heavier, and a larger surface is presented to the pressure from the intestines and muscles of the abdomen. From these two causes the organ descends in the early months of gestation. The inferior portion of the uterus can readily be felt pressing firmly upon the plane of the perineum, and not unfrequently to such a degree as to flatten the os uteri, or to produce a flexion of the cervix. The organ, however, being enlarged, there is apparently little or no descent of the fundus of the uterus, which can be readily felt, during the first months of pregnancy, in thin subjects, below the brim of the pelvis.

During the third and fourth months the uterus gradually rises up in the direction of the axis of the superior strait, so that, by the end of the fourth month, it is said to be out of the pelvis; that is, the large superior portion is above the linea ilio-pectinea, while the inferior portion and neck still projects into the cavity of the pelvis. The cause of this ascent evidently arises from the inclination of the sides of the pelvis inward, and from the conical form of the uterus; hence, as the cone of the uterus is gradually enlarging, it must as gradually be pressed upward, notwithstanding the resistance from the parietes of the abdomen, etc. We have reason to believe, in a few instances, this rising of the uterus out of the pelvis is impeded by the projection of the sacrum, giving rise to symptoms of irritation; and as the organ enlarges, it occasionally slips suddenly through the superior strait, owing to some accidental motions of the patient, or pressure from a distended bladder or rectum.

After the fourth month the uterus readily ascends in the cavity of the abdomen, in proportion to its development; the anterior walls of the abdomen gradually yield to the internal pressure, while the small intestines, attached to the posterior part of the abdomen by the mesentery, are pushed by the ascending organ to the superior and posterior portions of the abdomen. At the eighth month the uterus presses against the margins of the thorax, which afford more resistance to its ascent, so that, during the ninth month, the whole body of the uterus is directed anteriorly, necessitating

a more rapid dilatation of the anterior parietes of the abdomen.

During this process of ascension, the anterior surface of the uterus is kept in contact with the anterior wall of the abdomen, owing to the attachment of its broad ligaments to the sides of the pelvis, and, especially, to the round ligaments proceeding from the angles of the uterus to the abdominal canal. Although these ligaments elongate during pregnancy, yet, from their strength and contraction, they keep the fundus of the uterus as near as possible toward the anterior part of the abdomen, so that the axis of the uterus will continue to correspond to the direction of the axis of the superior strait, excepting so far as this tendency is successfully counteracted by the resistance of the abdominal tissues. This position of the uterus is maintained also by the pressure of the intestines and other viscera situated above and behind the uterus. The small intestines, owing to the shortness of the mesentery, are necessarily prevented from reaching the anterior surface of the uterus.

By an external examination the fundus of the uterus can generally be felt, at the end of the fifth month, midway between the pubis and the umbilicus; at the end of the sixth month, at or above the umbilicus; at the end of the seventh month some two inches higher; at the end of the eighth month it has reached the epigastric region, and its future ascent is then resisted by the margins of the thorax. These declarations must be received with much allowance, as the ascent of the fundus is influenced by numerous causes, such as a greater or less resistance of the parietes of the abdomen, a greater or less distension of the intestines, enlargements of the viscera, tumors, dropsies, deformities, etc.

The *position of the os uteri* varies at the different stages of pregnancy. It has already been remarked that, during the first and second months of pregnancy, it presses firmly upon the posterior wall of the vagina; sometimes it is turned somewhat forward toward the os vaginæ, and in some instances also, owing to flexion of the neck of the uterus, the os uteri corresponds to the opening of the vagina. During the third month the os is usually found in its natural position, pointing toward the coccyx: after the rising of the uterus, it is inclined somewhat posteriorly, which inclination of the os continues to a greater or less degree to the full period of gestation. At this time a prominence on the surface of the uterus, extending from the front of the cervix to the pubis, usually formed by the presenting part of the child, can generally be detected, and is sometimes called the "uterine tumor."

It would seem that the position of the os uteri in

the posterior part of the pelvis can only result in consequence of the bending of the body of the uterus over the promontory of the sacrum, as the fundus appears to be higher up in the abdomen than is compatible with a perfectly straight condition of the uterus.

Obliquities of the Uterus.—The womb, however, does not always occupy, during the latter months of gestation, the exact position now indicated. The pressure of the abdominal parietes, especially in first pregnancies, and the great prominence of the lumbar vertebræ, cause this organ to incline to one side or the other, toward the right or left hypochondriac regions, so as to give it an oblique position in the abdomen. The fundus being directed sometimes to the right side, the os uteri, at the opposite extremity of its axis, is directed more or less to the left, but in other instances the fundus is directed to the left hypochondriac, and the os to the right side of the pelvis. These are termed the *right and left lateral obliquities* of the uterus. As the right obliquity is much more frequent than the left, being eight times in every ten, according to Cazeaux, much speculation has existed to account for this phenomenon. It is manifestly not owing to the condition of the rectum, as the uterus is out of the pelvis. It may partially be the result of the habit, natural to most persons, of sleeping chiefly upon the right side; but the most positive reason for this obliquity we believe, with Desormeaux, to be the sigmoid flexure of the colon, which is often distended with flatus as well as fæces, and occupies the left iliac fossa; while the cæcum in the right iliac fossa presents comparatively a slight counteracting agency. It is possible, also, that the implantation of the placenta on the right or left side of the uterus, or the position of the fœtus itself in utero, may have a determining effect on the position of the fundus of the uterus. We can perceive, however, no reason for subscribing to the opinion of Madame Boivin, that it is owing to a shortening of one or the other of the round ligaments of the uterus; for, as Cruveilhier has well observed, such a shortening is the effect rather than the cause of the obliquity.

In women who have borne many children, the abdominal parietes are often so relaxed as readily to yield to the pressure of the distended uterus, so that the whole organ projects anteriorly over the symphysis pubis, toward the thighs of the patient. This is the *anterior obliquity* of the uterus, the fundus greatly projecting in front, while the os uteri is found just below, and sometimes even above, the promontory of the sacrum. This should be distinguished from an anteversion of the uterus, as then the organ is in the cavity

of the pelvis; while obliquities concern the organ when in the cavity of the abdomen.

Of course a posterior obliquity of the uterus cannot occur, owing to the projection of the vertebral column; nevertheless cases are upon record where the os uteri has been found near to the pubis, and even sometimes above the body or rami of the pubis, owing probably to some flexion of the uterus, some great relaxation of the lower portion of the abdominal walls, or some deformity of the pelvis.

Alterations in the Structure of the Uterine Tissues.—It has already been remarked that, in consequence of the presence of the new being, a hypertrophied condition of the uterus takes place after fecundation. This, of course, involves all the organic actions of the tissues, especially of the vascular system, implying increased determination of blood, and consequently nutrition and development. We find, therefore, that the *arterial system* becomes very rapidly developed. The uterine and ovarian arteries are enlarged to several

Fig. 17.



Blood-vessels of the Pregnant Uterus.

times their usual size; while the corresponding veins are augmented, perhaps even to a greater degree. These developments are observed chiefly along the edges of the uterus toward the cervix, and also at that portion of the uterus where the placenta is attached. Here the demand is so great that the veins often obtain an enormous size, and appear to inosculate very freely with each other, forming apparently large cavities opposite to the placenta, which have been termed venous sinuses or cells. It has been satisfactorily demonstrated that many of these large veins or sinuses have patulous orifices on the internal surface of the uterus, where they are closed by the membranes of the placenta, so that no hemorrhage ensues during the adhesion of this body; but on the partial or total separation of the placenta, profuse venous hemorrhage will follow the exposure of these orifices, unless the flow

of blood be arrested by the formation of coagula, or by contraction of the uterus, so as to close these patulous orifices of the veins. In post-mortem examinations after delivery, many of them are sufficiently large to admit a gun-shot probe, or even, it is said, the end of the little finger, and evidently they are continuous with the uterine veins or sinuses. Dr. Ramsbotham supposes that they are not proper orifices, but openings

or deficiencies in the sides of the dilated veins of the uterus.

The development of the arterial and venous systems may be observed also on the vagina, Fallopian tubes, ovaries, and other appendages of the uterus.

Similar developments are also observable in the *lymphatic* and *nervous* systems of the uterus. Many interesting and valuable explorations of the developments

Fig. 18.



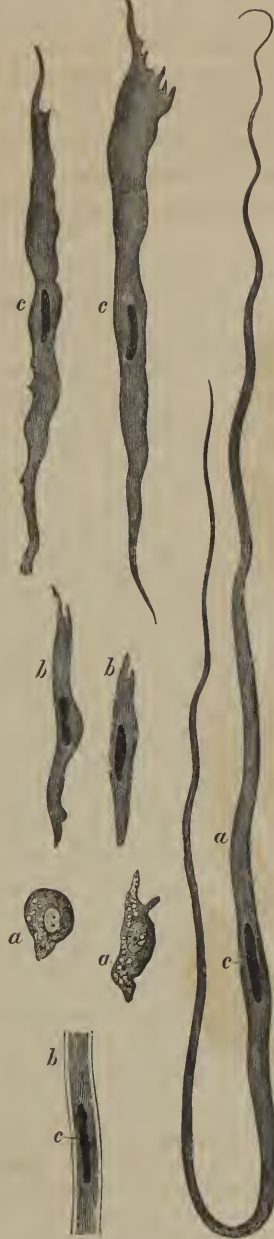
NERVES OF THE PREGNANT UTERUS.—*a*. Spermatic Vein. *b*. Spermatic artery. *c*. Vena Cava. *d*. Aorta. *ee*. Portions of Inferior Mesenteric Nerves, Branches of the Sympathetic. *fg*. Fourth and Fifth Lumbar Ganglia. *hik*. First, Second, and Third Sacral Nerves. *mam*. The Lumbar and Sacral Nerves which form the Great Sciatic. *n*. Branch from the Fourth Sacral to the lower part of the Rectum. (After Moreau; from the body of a woman dead four days after labor.)

of the nervous tissue, during gestation, have been made of late years by Robert Lee and others.

Not only is there an enlargement of the arteries, veins, nerves, etc., but also of the *muscular tissue*. The fibres of this tissue, the rudimentary existence of which could hardly be detected in the unimpregnated state, are soon very perceptible in all parts of the organ. They are so numerous, that they may be regarded as the proper parenchyma of the uterus, which, therefore, may be considered as a hollow muscle, with two very minute openings at the superior angles, and one comparatively large at the inferior angle of the organ.

Anatomists have studied the direction of these fibres very carefully, and have arranged them under the two general divisions of the internal and external planes of muscular fibres; the former are supposed to run more in the longitudinal direction, and the latter in a circular direction around the three angles of the uterus. Hence, we hear of the circular fibres of the lower portion of the uterus and of the cervix, around the os uteri as their centre; and also of the circular fibres around each horn of the uterus, having the orifices of the Fallopian tubes as centres. The longitudinal fibres are also supposed to run in different directions; many of them are traced obliquely from the fundus of the

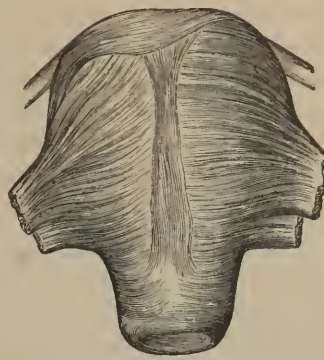
Fig. 19.



MUSCULAR FIBRE CELLS, FROM A GRAVID UTERUS, IN DIFFERENT STAGES OF DEVELOPMENT.—*a*. Formative Cells. *b* and *c*. Cells at an advanced stage, from a Uterus at the fifth month. The long Cell is taken from another Uterus at the sixth month. *c*. Its Nucleus. (After Kölliker.)

uterus to the round ligaments on the sides of the organ, while others extend, with less directness, to the inferior portions of the cervix. It is, however, very difficult even for a most expert anatomist to trace the direction of these fibres; they are so short, so interlaced with each other, and the other tissues of the organ, that no definite arrangement can positively be made. Mde. Boivin, who has devoted much attention to this subject, and whose authority has generally in-

Fig. 20.



External layer of Muscular Fibres.

Fig. 21.



Internal layer of Muscular Fibres.

fluenced the profession, arranges the fibres as we have just represented them.

M. Cazeaux quotes Deville as having examined this subject in numerous instances, and states that he thinks that the exterior lamina is composed of transverse and longitudinal fibres, interlaced very intimately, and connected with a longitudinal fasciculus, which extends from the neck of the uterus anteriorly over the fundus, terminating at the root of the neck posteriorly. The reader will find in some works a minute description of the course of many of these fibres; nevertheless, the general declaration is true, that it is impossible to develop the intricate character of this tissue, even at the full period of gestation.

Practically we know, however, that the enlarged uterus can be most powerfully and efficiently contracted in every direction, so that even small portions of fluids can be expelled from its cavity when no obstructions exist at its orifice. By the action of these fibres the os uteri can be dilated, the longitudinal axis of the uterus diminished, the os uteri being drawn toward the fundus, and the fundus toward the os, while circular contraction may take place in the cervix, in the body, and also around each horn of the uterus, according to the various circumstances or exigencies which may arise.

It has been made a question, whether there is any actual increase in the proper substance of the uterus during pregnancy; or, whether the increased size of the organ is entirely due to the unfolding and development of the muscular, vascular, and other tissues, and to the increased quantity of the fluids. There is probably truth in both of these opinions, as the size must depend upon the increased space occupied by the blood-vessels, and to the increased softness and relaxation from fluid interstitial deposits. Nevertheless there seems to be a proper hypertrophy, or increased deposit of nutritive material, as there is not only apparently

a great enlargement of the solid portions of the organ, but an enormous increase of weight between the virgin uterus and the same organ immediately after parturition, as examined in the dead subject; the weight of the former is only about an ounce and a half, and the latter weighing from one to two pounds. This fact is not to be explained by the additional quantity of fluid in the uterus after delivery.

Notwithstanding these wonderful developments of the tissues during pregnancy, the real thickness of the walls of the uterus are not materially altered. The normal thickness of the impregnated uterus is about four lines; from the first to the fifth month it is gradually increased to about five lines; after which large portions of the uterus very frequently diminish in thickness to four, three, two, and, it is said, even to one line in thickness; so that the form of the uterus is affected by the motions of the child, by the positions of its head and extremities, or even by the action of the abdominal muscles. Generally, however, at the cervix of the uterus, and at the location of the placenta, the walls maintain from four to five and even six lines between their internal and their external surfaces.

The external, or *peritoneal* covering of the uterus, must also be developed with the enlargement of the organ, not perhaps, however, in proportion to its increase of size; but during its growth, the uterus seems to extend between the laminae of the broad ligaments, which are therefore deployed or unfolded on the anterior and posterior surfaces of the uterus, while the Fallopian tubes, ovaries, round ligaments, etc., are thus approximated nearer to its sides. Nevertheless, the uterus is as completely covered by the peritoneum in the pregnant as in the unimpregnated condition; the peritoneum even posteriorly dipping down not only over the cervix, but over the superior portion of the vagina.

It may be observed, in addition, that the round ligaments of the uterus are also developed very much in pregnancy; their length being increased from four to eight, or even ten inches; their fibrous or muscular character, derived from the uterus, being clearly demonstrated. It is said that the muscular fibres of the right ligament are proportionately more developed in the right lateral obliquity of the uterus, and those of the left ligament in displacements upon the opposite side.

The *Fallopian Tubes*, or *Oviducts*, are also exceedingly vascular, and enlarged during gestation, especially toward their fimbriated extremities, and are, by the alterations in the broad ligaments, brought nearer to the sides of the uterus. Cazeaux says that the ori-

fices of the Fallopian tubes are often observed to have descended to one-fourth or even one-half of the length of the organ.

The *Ovaries* also continue loaded with blood even for some time after delivery. This is due, not only to the general turgescence of the uterine vascular system, but also to the presence of one or more corpora lutea, whose existence continues through and often beyond gestation.

The *Vagina* is necessarily affected by the uterine developments, especially as to its size and direction. The orifice of the vagina gradually becomes larger, or at least more relaxed; this is true also of the whole vaginal tube, owing to the vascularity and increased secretions. At first the vagina is increased in breadth, but is shortened by the prolapsus of the uterus; afterward it is elongated, and its direction altered in consequence of the elevated position of the neck of the uterus, and its eventual proximity toward the superior portion of the sacrum. The whole vagina, at the latter period of utero-gestation, is often relaxed, and even thrown into folds, having somewhat the form of a truncated cone bent anteriorly, the base being attached to the cervix of the uterus, and the truncated apex being the external orifice. The circulation of the vagina becomes more active, and the blood-vessels enlarged. Very often, from pressure upon the venous trunks, there is considerable congestion of their radicals, the whole mucous membrane becoming of a violet or purplish color, and sometimes maculae or spots are observable, or even thrombus, or ecchymosis.

Physiological Changes.—The exaltation of its vital actions are shown by the increased irritability and sensibility of the uterus, as compared with the non-pregnant condition. The increased irritability is manifested by the rapid determination of blood to its tissues, and the consequent increased nutrition, development and size of the womb, in the manner already specified. There is a "vital erection" and exaltation of its organic life, from the beginning to the termination of this important process of gestation. After delivery, there is a rapid diminution of this excitement; the uterus greatly reduced in size by the evacuation of its contents, and measuring but ten inches in length, and seven inches in breadth or thickness, is still found large enough to remain above the superior strait, being felt in the hypogastrium. It, however, rapidly diminishes by the continued contraction of its fibres, the effusions from its internal surfaces of sero-mucoid and sanguineous matter, termed *lochia*; so that, by the end of the tenth day, it generally descends into the cavity of the pelvis; the irritability still gradually subsides, and the organ is eventually

reduced to nearly its normal size in the course of two or three months after parturition.

The exaltation of the uterine sensibility during gestation is equally evident from the sympathetic disturbances excited in the bladder, the rectum, the spinal and cerebral systems, with all their dependencies. Hence, the development of neuralgic and hysterical symptoms in various parts of the body. Hence, the disturbances of the brain, heart, lungs, stomach, etc., from the uterine excitements. Hence, also, soreness, cramps, pains in the uterus itself from pressure, from the motions of the child, from irritations of the stomach and bowels, and from the various excitements, mental and moral, which may agitate the patient. Bad consequences necessarily will frequently result from this increased sensibility of the organ, especially when any abnormal or unnatural irritations exist in any part of the animal economy.

The contractions of the uterine fibres are excito-motory, and, like those of the hollow muscles of the heart, stomach, and bowels, are involuntary. They are induced independent of the will of the patient. Hence, they may continue, in cases of paraplegia; and, also, for a short time after death.

Nevertheless, these contractions are very much influenced, as above stated, by the ever varying conditions of the mental and moral state of the woman, showing, as in the case of the heart, the intimate connection between the excito-motory and the cerebral system of nerves.

The *functions* of the uterus are changed by the act of conception; that of menstruation ceases, that of gestation commences. The lining membrane of the uterus no longer secretes every lunar month a peculiar fluid of a sanguineous character, but becomes turgid, and forms a new membrane. This membrane, which eventually encircles the ovum, and forms the medium of communication with the uterus, undergoes various modifications until it eventually degenerates into a loose areolar tissue, connecting the chorion with the internal surface of the uterus. Opposite the placenta, however, it still maintains a membranous character, covering the cotyledons of the placenta, and separating them from the internal surface of the uterus. This portion of the membrane has received various denominations, such as, "pellicle," "membranule," "membrana serotina," etc. Its existence after delivery is very evident; but its origin, the time of its formation, and even its existence, have been questioned. In our opinion, it is evidently the remains of the original connection formed between the ovum and the internal surface of the uterus.

After delivery, the uterus, having returned to its

normal condition, remains apparently quiescent, as regards its functions, from nine to twelve months, or even longer, the menstrual discharge not returning; the peculiar excitement necessary for this discharge being quiescent, or transferred to the mammæ for their development, and the consequent formation and excretion of milk for the sustentation of the new-born infant. When the process of lactation declines, that of menstruation becomes once more re-established.

Still another question of some practical importance has been agitated, as to the *cause of the enlargement* of the uterus. By some, it has been regarded as a simple passive distension from the pressure produced by the gradual development of the ovum within its cavity; as the ovum enlarges, it distends the uterus mechanically. The other, and far more plausible supposition is, that the uterus enlarges by its own inherent properties upon the ovum simply as a mould. It may be objected to the former supposition, First. That the uterus actually enlarges to a considerable extent before the ovum has reached the orifice of the tube, or becomes sufficiently large to occupy the cavity of the organ. Second. That the thickness and density of the walls of the uterus, especially at the commencement of pregnancy, must far counterbalance any pressure which can possibly be made by the thin and delicate tissues of the ovum. We know these tissues are never very strong, are often ruptured, even before the commencement of labor, and are almost universally broken by the first powerful contraction of the uterus. Third. Any pressure from within, sufficient to dilate the uterus, must have a corresponding reaction on the delicate embryo, altogether incompatible with its development, or even safety. Fourth. On examinations, which have occasionally been made during pregnancy, and constantly during labor, we discover that these membranes of the ovum are never tense, or resistant, except during the active contractions of the uterus; at other times they are soft and relaxed; proving that there is no pressure exerted by them on the walls of the uterus, or on the embryo within its cavity.

That the uterus is developed by its own inherent powers is proved,

First. Not only by the fact just mentioned, that it enlarges prior to the presence of the ovum in its cavity, but even in cases of extra-uterine pregnancy, where the ovum never reaches the cavity; and also we have many examples of hypertrophy of the unimpregnated uterus, without any body or substance acting as a distending force.

Second. By the facts already detailed, showing that all the tissues of the uterus are enlarged, its blood-vessels dilated, and that the density of the uterus is dimin-

ished during gestation: all of which facts show the result of increased organic actions, and are inconsistent with the idea of mechanical distension which would augment the density of the walls, as well as diminish their thickness, and obliterate the blood-vessels.

The truth seems to be that, in consequence of the presence of the new being, and the gradual development of its organs and its appendages, the membranes, the liquor amnii, etc., a constant excitement or irritation is kept up, whence, in obedience to the common laws of the economy, result congestion, nutrition, and development,—the ovum and the uterus enlarging *pari passu*, the one being accommodated to the other, precisely as the cranium enlarges to accommodate the developments of the brain during infancy and childhood.

While these changes are going on, analogous alterations are observed in the *mucous membrane* of the cavity of the body of the uterus. This tissue becomes more vascular and swollen; there is a development of the uterine glands, and of the capillary blood-vessels. The subsequent changes, although they have been minutely investigated, are still, however, unsettled. The disciples of the Hunterian school contend that, in consequence of the excitation of the mucous tissue, there is an exudation of an albuminous matter upon the surface of this tissue; that this becomes organized, and eventually forms a new membrane, lining the whole cavity of the body of the uterus, but not extending into the cervix. According to many observers three openings exist in this membrane, at the orifices of the Fallopian tubes, and at the upper extremity of the neck of the uterus. Many others, however, following Velpeau, declare that there are no openings through this tissue, but that it covers the internal os uteri, and also the orifices of the Fallopian tubes, into which it

case of abortion, however early, and also in labor. This formation is generally completed in a few days after fecundation.

The decidua, when thrown off entire during the first few weeks of pregnancy, has often the appearance of a fleshy mass, and has been mistaken for a coagulum of blood. Its exterior, or uterine surface, is rough; internally it is, however, quite smooth and polished. Its thickness often measures as much as four or five lines. The cavity of the decidua corresponds in shape to that of the uterus, and is said to contain a seroid fluid, generally of a reddish color. There is every proof of a perfect organization of the decidua. It grows with the uterus, and forms adhesions not merely with the internal surface of this body, but subsequently with the tissues of the ovum. Blood-vessels exist in its tissues, evidently carrying red blood, and capable of being injected from the uterine vessels. It is capable of morbid excitement and degeneration; hence it becomes sometimes indurated, and may form preternatural adhesions to the uterus or the ovum. Serous or sanguineous effusions also occur into its substance and its cavity; and, finally, it is very universally acknowledged to be the sole medium of connection between the child and its parent.

Although many of the authors of the present day still advocate the Hunterian views of the decidua, as being a new production, nevertheless the researches of most modern physiologists would indicate that no adventitious membrane is formed. Careful microscopic examinations, they say, prove that the decidua is a simple development of the mucous membrane of the uterus. This membrane becoming very vascular and turgid, is thrown into folds projecting into the cavity of the uterus; and hence the orifices of the Fallopian tubes, and that at the cervix uteri, continue pervious for some time after fecundation. The mucous membrane of the neck of the uterus, although somewhat developed, does not participate in this turgescence. It is contended that this membrane continues to be developed until the ovum has made its attachments to some portion of its circumference. At this point of adhesion the development continues, so as to form what is termed the uterine or maternal portion of the placenta; while the rest of the tissue gradually alters its character during the progress of pregnancy, becoming less vascular, and degenerates into a very delicate connecting tissue between the chorion and the uterus. It is also maintained that this membrane is truly deciduous; its attachments to the muscular coat of the uterus become so slight, that they can easily be destroyed; indeed, that they are ruptured by the contractions of the uterus, not merely at the full period of

Fig. 22.



Membrana Decidua.

often projects. This new formed tissue is called the *membrana decidua*, because it is thrown off in every

utero-gestation, but in every case of abortion, even at the earliest periods of pregnancy. It is said, also, that in such separation, during the first three months, the muscular tissue of the uterus will be completely denuded of a mucous membrane; and most observers have found that, although a new mucous tissue can be noticed over most of the cavity after the third month, no such membrane can be detected where the placenta was attached. At this spot, however, after delivery, a mucous membrane begins to be generated, which will be perfected at the expiration of three or four months.

DEVELOPMENTS OF THE OVUM AND ITS CONTENTS.—

Such are the preparations made by the uterus for the reception of the fecundated ovum. The ovum, after leaving its original position in the vesicle of the ovary, passes through the Fallopian tube until it reaches the cavity of the uterus. The time occupied in the human subject in the passage has not been accurately ascertained, but is generally estimated at from six to eight days, during which the ovum is simply in contact with the mother's tissues, but without any adhesion.

Soon after it arrives at the cavity of the uterus it is described as consisting of two membranes, the *chorion* and the *amnion*, enclosing the minute embryo. The amnion, or internal membrane, is originally much smaller than the chorion, and separated from it by a delicate reticulated tissue. As the amnion grows more rapidly than the chorion, this reticulated tissue disappears almost entirely, so that the amnion appears to be in contact with the internal surface of the chorion. The amniotic sac, as it is developed, is filled with a fluid in which floats the embryo. The fluid, termed the *liquor amnii*, or the waters, increases with the growth of the ovum and the uterus. At the end of the third month of gestation it exceeds the weight of the foetus. The quantity augments until the full period, when it is usually estimated at from twenty to thirty fluidounces. It varies, however, exceedingly in different women, or even in the same woman in different pregnancies. It is sometimes enormous, large quantities being discharged before and after the birth of the child; in other cases it is very trifling, one or two fluidounces only being perceived. Hence we hear of what is called "dry labors," where the membranes at the os uteri do not protrude, but are found in close contact with the head of the foetus, and the quantity of the liquor amnii is so trifling as not to be noticed.

The nature of the liquor amnii is peculiar; it contains a small portion of albumen and saline matters, which augment toward the latter periods of gestation, giving

it a more viscid or unctuous character. Its specific gravity is rather greater than that of water; its color varies, sometimes being very light, but at other times yellowish or greenish. In the latter months portions of meconium are occasionally perceived in the water, affecting its color. There is reason to believe also that urine is occasionally excreted into it by the foetus before delivery, inasmuch as when the urethra has been obstructed the foetal bladder has been enormously distended, or even ruptured.

The source of the amniotic fluid is doubtless from the amnion. The uses of the liquor amnii are very important. It facilitates the development, and maintains the form of the ovum and the uterus. It protects the embryo from pressure, and also lessens the influences of falls, blows, or other accidents to the mother. It facilitates the growth of the foetus, and allows of its active motions. It greatly contributes to the favorable dilatation of the os uteri during labor, and after the membranes are ruptured it favors relaxation of the vagina and perineum, thus facilitating the passage of the child, and the easy performance of obstetric operations.

Both membranes of the ovum in the early stages are very thin, smooth, and translucent, maintaining a similar character even to the full period of gestation, becoming, however, stronger and more opaque. On the exterior surface of the chorion small villi are soon observable. They are of an arborescent character, and so abundant that they give to the whole ovum a delicate velvety or spongy appearance. Hence, we read of the "spongioles" and the "shaggy surface" of the chorion.

The ovum, thus constituted, appearing at the orifice of the Fallopian tube, comes in contact with the membrana decidua lining the cavity of the uterus. According to the views of those who maintain that this membrana decidua is a new membrane, without openings, the ovum is arrested upon the external surface of the decidua; as the ovum grows, that portion of the decidua to which it is attached grows with it, so that as the ovum continually encroaches upon the cavity of the uterus during its development, it becomes completely invested with the decidua. This covering is, therefore, a new production, developed over the ovum, the uterus still remaining completely lined by the original decidua. This new portion, thus reflected over the ovum, is termed the *decidua reflexa*. Should these tis-

Fig. 23.



Ovum of five weeks.

sues, therefore, be examined at the sixth or eighth week of gestation the ovum will be found projecting into the

Fig. 24.



MEMBRANA DECIDUA WITH AN OVUM OF ABOUT SEVEN WEEKS.—*a*. Decidua Vera. *b*. Decidua Reflexa. *c*. Chorion. *d*. Amnion. *e*. Umbilical Cord. *f*. Embryo. *g*. Membrana Decidua, extending into the neck of the uterus.

cavity of the decidua in a manner very similar to the projection of the heart into the pericardium. The ovum continuing to be developed, the decidua reflexa is brought into contact with the decidua vera, with which it unites most intimately, so that in a short time no line of demarcation is evident, the two membranes appearing as one, lining the uterine cavity. The ovum thus is again united to the mother's tissues. The villi of the chorion, being completely covered with the laminae of the decidua, become the only media of connection between the embryo and the maternal tissues.

Those who represent the membrana decidua as a simple development of the mucous membrane contend that the ovum passes into the uterine cavity, where it is arrested by the folds of the mucous membrane. At this place the membrane is still more rapidly developed, and soon covers the ovum, so as to constitute a decidua reflexa, as above described, re-establishing the connection between the parent and the child.

During the second and third months of gestation other changes will be observed. The embryo will be found floating in the liquor amnii, having no other attachment to its membranes than that through the umbilical vessels at the place where these vessels are distributed to the chorion. At this point there is a rapid development of the villi, while on the remaining

Fig. 25.



OVUM OF ABOUT FIVE MONTHS.—*a*. Portion of Membrana Decidua. *b*. Placenta. *c*. Chorion. *d*. Amnion containing Fetus.

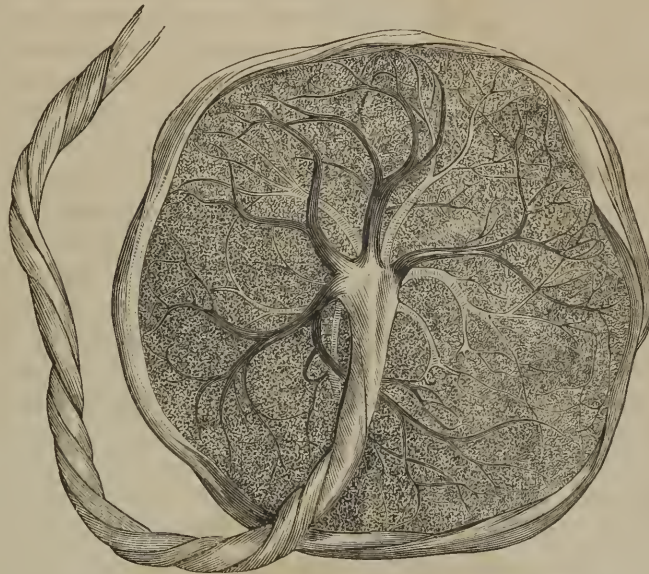
portions of the chorion they gradually disappear. The enlarged villi, just mentioned, continue to be developed, and are covered with the *membrana decidua*, with which they become most intimately connected, and constitute the body known as the *placenta or after-birth*. This body is quite perfect at the third month of gestation, and continues to augment in proportion to the development of the *fœtus* until term. On every other portion of the ovum the *membrana decidua* diminishes in size and vascularity, so that at the full period it is exceedingly thin and delicate, the strength

of the ovum depending almost exclusively on the chorion and amnion.

Hence, in the early period of gestation the communication between the child and the parent is maintained through the medium of the spongioles of the chorion and the *membrana decidua*, until the third month; subsequently the sole connection appears to be through the placenta, constituted of a *fœtal* and *maternal* portion.

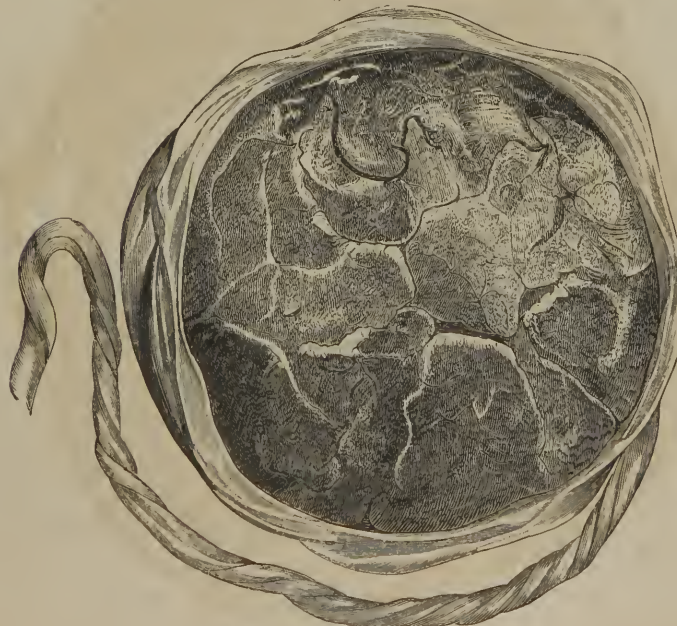
The placenta, when thrown off at the full period of gestation, is a flat body of a circular form, having its

Fig. 26.



Fœtal surface of Placenta.

Fig. 27.



Maternal surface of Placenta.

fœtal surface covered by the chorion and amnion, and its uterine surface by the *membrana decidua*. Its thickness varies in different portions, being nearly one inch toward its centre, and about half an inch toward the circumference. It presents a lobulated appearance upon the exterior surface, but interiorly there is no marked distinction between the lobes. Occasionally, however, one or more lobes, or small *placentæ*, are found separated from the main body, being connected with it by blood-vessels and membranes. These are called *placentulæ*.

The umbilical vessels of the child, covered by the chorion and amnion, pass to the inner surface of the placenta, usually toward the centre, not unfrequently toward the margin, from which point they ramify through the placenta. Immediately after delivery the larger branches are seen forming a beautiful arborescent arrangement on the fœtal surface, covered by the chorion and amnion. These membranes are reflected from the internal surface of the placenta, over the umbilical vessels, to the body of the child, constituting, with a dense gelatinous matter filling up the interstices between the vessels, the *umbilical cord*. The gelatinous matter is occasionally, especially in premature infants, very trifling, but in other cases very abundant, forming irregular projections; hence we hear of "lean cords" and "fat cords." The umbilical arteries derived from the internal iliacs pass from the umbilicus to the placenta in a spiral course, being intertwined with the umbilical vein, which also runs in a slightly spiral direction. The umbilical vein, after entering the body of the child, diverges from the arteries and passes to the under surface of the liver, where it terminates in the left branch of the portal vein. The length of the cord, at term, generally is equal to that of the child, measuring eighteen or twenty inches; occasionally, however, it is very long, extending even to more than three feet. Sometimes it is very short, measuring only five or six inches, or, according to some, only two inches, or even being in close proximity to the placenta.

When fully formed, therefore, the placenta is a soft spongy mass, developed out of the villi of the chorion at that portion of the circumference to which the blood-vessels of the cord are determined, and covered exteriorly by the *membrana decidua* intervening between the spongioles and the uterus, and internally by the proper membrane of the chorion intervening between the spongioles and the amnion. These developed spongioles, into which penetrate the umbilical vessels, constitute what has been termed the fœtal portion of the placenta; while the *membrana decidua* constitutes the maternal portion. In the early stages of pregnancy, these portions are so loosely connected, that they often

spontaneously separate in cases of abortion. But after the fourth month such separation cannot be effected, so intimate is their union.

The *internal structure of the placenta* has not yet been fully elucidated, although much has been added to our knowledge by the careful investigation by anatomists and physiologists of the last few years. It is essentially a vascular tissue formed of the blood-vessels of the child and the mother, which ramify very minutely, and are closely interwoven with each other.

There is, however, no intercommunication or *inosculation* of the fœtal with the maternal vessels. This has been established by many interesting facts, some of which are of great practical importance.

Fine injections demonstrate that the umbilical arteries ramify very minutely to every portion of the placental mass, even to the uterine surface. These extreme capillaries form delicate loops, which are called the "tufts of the placenta," and communicate with the radicals of the umbilical vein, so that the fluid is returned back to the body of the child. Fluids thrown into the umbilical vein will pass into these ramifications of the umbilical arteries, and thus also demonstrate the intercommunication of the blood-vessels of the child in the placenta. No portion of the injected matter passes into the maternal vessels.

The blood of the child is peculiar as to its color, its consistence, its corpuscles, and the different proportion of its saline and organic elements.

Like the chick *in ovo*, the fœtus forms its own blood. Red blood is first seen in the cardiac region, and afterward along the umbilical cord to the chorion, indicating that the supply did not originally come from the blood-vessels of the parent.

At every period of gestation, when the placenta is thrown off, no blood escapes from the child's vessels. The placenta may even be immersed in warm water, and, if no obstruction exist in the cord, the circulation in the placenta may be continued for fifty or sixty minutes without any loss of blood to the infant.

Hemorrhages, however sudden and profuse from the mother, do not directly affect the fœtus. It often lives for some time after the death of the mother, and has then, sometimes, been extracted alive by the *Cæsarean* section.

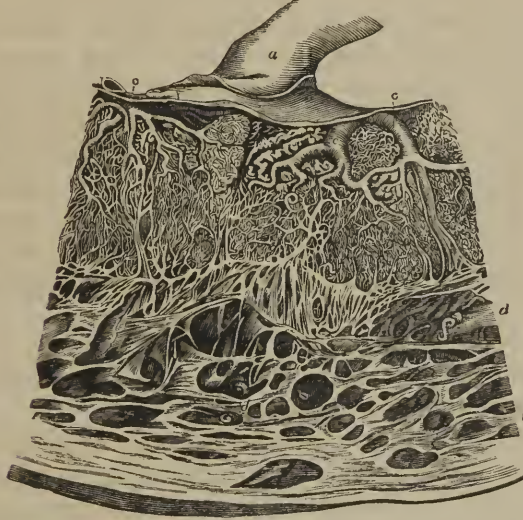
Hemorrhage also from the child *in utero* has no influence upon the mother. The umbilical cord has been found ruptured, and the child bloodless, without detriment to the parent.

Maternal blood, however, circulates in the placenta, but to what extent, and in what manner, is undetermined. In the early stages of gestation the *membrana decidua* undoubtedly receives red blood from

the uterine vessels; minute capillaries pass to and from the decidua, the "deciduous arteries" and "veins." As gestation advances, these vessels diminish in size and activity, excepting where the placenta is attached, at which place they are more developed, and are now termed *utero-placental arteries and utero-placental veins*, and are continuous with those of the uterus.

Injectations into the uterine arteries readily pass, not only into the large venous trunks, but also through the utero-placental arteries into the placenta. If this body had previously been removed, the injected matter would be effused in large quantities into the cavities of the uterus through the orifices in the veins.

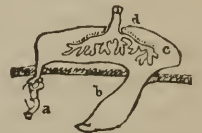
Fig. 28.



SECTION OF THE PLACENTA WITH THE PART OF THE UTERUS TO WHICH IT IS ATTACHED.—*a*. Umbilical Cord. *b*. Section of the Uterus, showing the Venous Sinuses. *c**c**c*. Branches of Umbilical Vessels. *d**d*. Curling Arteries of the Uterus.

The distribution of the maternal blood, carried to the placenta by the utero-placental arteries, has been the subject of minute investigation and much discussion. Dr. Wm. Hunter contended that these arteries communicated with cells or sinuses in the placenta, extending even to the foetal surface, and that this blood, after contributing to the wants of the foetus, was returned by the utero-placental veins to the uterine circulation, analogous to what was seen in the cavernous body of the penis. These ideas have been variously modified by subsequent observers, but are virtually maintained by the English obstetricians of the present day, most of whom speak of sinuses in the placenta, to and from which is conveyed the blood of the mother. Dr. Reid, of Edinburgh, on whose experiments much reliance seems to have been placed, considers that each delicate tuft of the umbilical vessels is surrounded by a sac, into which opens a small maternal artery, *a*, and from which passes a maternal vein, *b*; so that the maternal blood poured into this sac bathes the minute capillaries of the umbilical vessels.

Fig. 29.

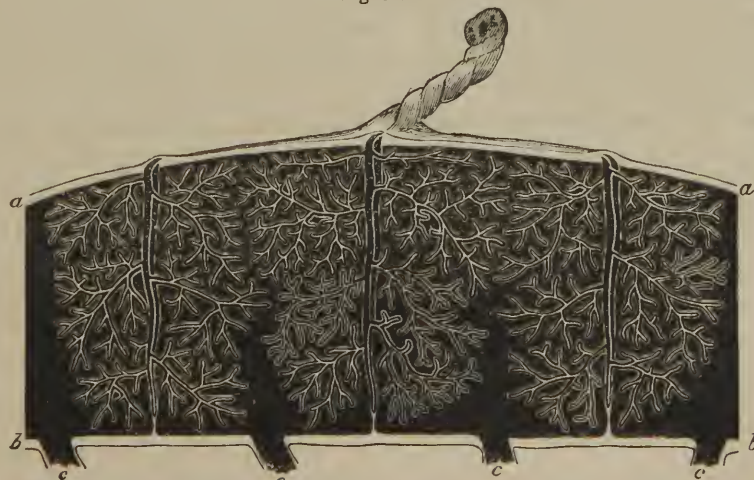


RELATIONS BETWEEN THE FETAL AND MATERNAL VESSELS IN THE PLACENTA.—*a*. Curling Artery of the Uterus. *b*. Uterine Vein. *c*. Sinus. *d*. Vessels of Foetal Tuft. (After Reid.)

By others it is contended that all the interstices of the placenta constitute a large sac, into which blood is poured from the utero-placental arteries, and brought back to the mother by the utero-placental veins.

Prof. Dalton, of New York, maintains analogous views of the structure of the placenta. He minutely describes the gradual development of the mucous follicles of the membrana decidua, into which the foetal tufts penetrate in the early stages of gestation, and endeavors

Fig. 30.



VERTICAL SECTION OF PLACENTA, SHOWING ARRANGEMENT OF MATERNAL AND FETAL VESSELS.—*a*, *a*. Chorion. *b*, *b*. Decidua. *c*, *c*, *c*. Orifices of Uterine Sinuses. (After Dalton.)

to show that they and the capillaries, spread over their walls, augment rapidly as these tufts enlarge, penetrating even to the foetal surface of the placenta. He contends that during this growth great transformations occur. The maternal capillaries, as they enlarge, are gradually fused into each other, so as to lose the character of a capillary net-work, becoming dilated into wide sinuses which communicate freely with the enlarged vessels of the uterus. These sinuses contain, during gestation, large quantities of blood, surrounding all the ramifications of the foetal vessels in every portion of the placenta. This mass, therefore, is regarded by Dr. Dalton as at least twice as large during foetal life as it is after delivery. He further states that the blood, which is discharged immediately after the birth of the child, comes not directly from the uterine vessels, but is pressed out from these vascular sinuses of the placenta.

Many physiologists have, however, denied that any sinuses exist in the placenta. Some careful experimenters describe the maternal arteries as penetrating into every portion of the placenta, their ramifications everywhere interlacing with the foetal tufts, and communicating with the radicals of the maternal veins, by which the blood returns to the uterus. Others, as Weber, describe the minute ramifications of the maternal arteries as terminating in small cells, which communicate with the maternal vessels.

These discrepancies of opinion are not restricted simply to the circulation of the blood in the placenta, but also as to the existence, size, direction, etc., of the utero-placental vessels exterior to the placenta. Velpeau and others positively deny that any such vessels can be found, others that the arteries and veins are of a large size, while many speak of the arteries as being very small and tortuous or curling, and the veins passing out obliquely from the uterine surface of the decidua as being somewhat larger. All acknowledge that these vessels are exceedingly delicate, being ruptured by the slightest attempt to separate the placenta.

It must be evident, therefore, that more experiments and observations are necessary for the elucidation of these difficult but interesting questions. Some important facts, however, may be considered as decided. As, first. The complete independence of the foetal circulation.

Second. The foetal vessels, in their ramifications, come into close contact with the maternal blood, either within the placenta or through the medium of the membrana decidua on its uterine surface.

Third. The nutrition of the foetus is maintained by the absorption of materials from the fluids of the mother.

Fourth. The decarbonization of the foetal blood is also accomplished in the placenta through the medium of the mother's blood.

Fifth. Upon the separation of the placenta during gestation, or after delivery, the patulous orifices of the uterine veins are exposed, giving rise to a venous hemorrhage, which can only be arrested by the contraction of the uterine fibres covering these orifices. Should such contraction not ensue, the hemorrhage will be profuse, and sometimes rapidly fatal.

Sixth. The connection between the placenta and internal surface of the uterus is very slight, being easily destroyed simply by the contractions of the uterus, or by the slightest traction.

Seventh. No nerves have been detected in the placenta, and hence no nervous influence can be directly propagated by the mother to the foetus.

The placenta, therefore, may be considered as the organ of respiration and nutrition for the foetus, and by some it is also regarded as an organ of excretion. In what manner these processes are accomplished is unknown.

Notwithstanding all that has been done of late years as regards the investigation of the anatomy and physiology of the placenta, and of the connections of this body with the uterus, much more is desired to elucidate some important practical questions.

The author has long been inclined to the opinion that no large blood-vessels pass between the uterus and the placenta; that the utero-placental arteries and veins are very minute, and so delicate as to be easily ruptured by any extraneous force; that the patulous orifices upon the internal surface of the uterus are closed by the membrana decidua of the placenta, with which the maternal blood, therefore, comes in contact without penetrating its structure; that the circulation in the placenta is exceedingly analogous to that in the lungs, impure blood being conveyed to it by the two umbilical arteries, and pure blood returned to the foetus by the umbilical vein; that the utero-placental vessels, like the bronchial blood-vessels of the lungs, are merely "nutritive," not for the foetus, but for the placenta and its appendages; and hence that the processes of aëration and absorption of nutritive materials for the foetus takes place through the medium of the membrana decidua, which is in contact with the maternal blood as it is presented at the large patulous orifices of the uterine veins. The nutrition or the organic life of the placenta evidently depends upon the mother and not upon the foetus. This is proved by the well-known fact that the placenta, membranes, and cord perish when detached from the uterus, the cord dying and falling off at the umbilicus. Accoucheurs are also well

acquainted with the fact, that during gestation the embryo or foetus often dies, while the placenta survives and grows for weeks or months in utero.

The above theory might be defended by an array of facts and arguments, but in the present state of our knowledge no statement can be regarded as perfectly accurate; further investigations are needed. In the meantime the seven deductions above-mentioned may be regarded as very important, as forming practical principles for the obstetrician.

Developments of the Embryo.—These developments have been most accurately described by modern embryologists. It will be sufficient for our purpose to notice a few facts of importance to the practical obstetrician.

The embryo is distinctly visible at the third week after fecundation; it is then about four lines in length, and weighs about two grains; it is slightly curved; the posterior surface is convex, and the anterior concave. Very soon a line of demarcation is observed, separating the embryo into two portions, one larger and more spherical, and the other smaller and more conical; the former constitutes the head, and the latter the body of the embryo.

At the fifth week the cephalic portion is much developed, and rudimental spots for the features are discernible; about the same time, slight elevations indicate the rudiments of the upper and lower extremities. The embryo is now about eight lines in length, and weighs fifteen grains.

The development of the internal and external organs advances with great rapidity, so that by the end of the eighth week it assumes more of the foetal form, and measures about twenty lines in length, and weighs about half an ounce.

At the end of the third month it is about five inches in length, and weighs about three ounces. At this period the internal and external organs are so far developed, that, by many, its embryotic life is regarded as complete.

At the end of the fourth month it measures about seven or eight inches, and its weight is about seven ounces. At this period, or soon afterwards, the foetus is not only capable of motion, but its movements are so strong as to be recognized by the sensations of the mother; this is termed "quickening," and generally occurs between the sixteenth and the eighteenth week of utero-gestation.

At the expiration of the fifth month its length is increased to ten inches, and its weight to eleven ounces. Its movements in utero are very decided, and if, through any accident, it should be delivered, respiration may occur, and continue even for several hours.

The foetus, however, is not considered "*viable*" until the end of the sixth month, although cases have occurred where the child has survived if born during the twenty-third or twenty-fourth week. At the end of six months the foetus measures about twelve inches, and weighs one pound.

At the end of the seventh month the testicles are often observed in the scrotum, the pupils of the eyes are formed, and the child measures fourteen inches, and weighs at least two and a half pounds.

At the end of the eighth month many foetuses are well developed, having an abundant deposit of adipose matter in the sub-cutaneous tissues, and measures eighteen inches in length, and weighs five or six pounds.

At the end of the ninth month foetal life is at its maturity, the new being having not only the organs of vegetable life perfected and in full activity, but also those of animal life perfect in their structure, yet almost entirely passive in utero, but ready for instantaneous action at the moment of birth; when, under suitable stimuli, all the phenomena of animal life will be speedily manifested.

At this time the child, when extended, usually *measures* from nineteen to twenty inches from the apex of the head to the heels. While in utero it is curved into an elliptical or ovoid shape, owing to the flexure of the head upon the thorax, and the lower and upper extremities being gathered in front of the body. This elliptical form exists during the whole period of gestation, even in the embryotic condition; the large vesicles, forming the head and body of the embryo, are bent toward each other, while the features and the extremities pullulate, and are developed on the concave surface of this curve. While floating in the liquor amnii, the perfection of the foetal ellipse is continually varied by the active and passive motions of the child; but after the liquor amnii has been evacuated, and the contractions of the uterus ensue, the ellipse becomes more perfect, owing to the degree of pressure to which the child is subjected, and the resistance at the inferior orifice of the uterus. By the powerful contractions of the uterus the child is thus rolled up into a very regular elliptical¹ ball, (Plate V., Fig 41,) the long diameter of which extends from the vertex or occiput to

¹ Many authors prefer the use of the word "ovoid," as applied to the form of the foetus. This expression is liable to objection, as in the early periods of pregnancy the cephalic portion would constitute the greatest breadth; while in the latter periods the pelvic extremity, including the limbs, which are often much extended, is regarded as the large extremity of this ovoid. We prefer, therefore, although not mathematically correct, the word "ellipse," which may be applied to the form of the foetus during the whole period of gestation, and also during the process of labor.

the coccyx, and usually measures twelve inches. It is, therefore, the occipito-coccygeal diameter of the foetal ellipse, and usually corresponds to the axis of the uterus. The short, or conjugate, diameter of the foetal ellipse is from one shoulder to the other, measuring three and a half or four inches. It is of great importance to bear in mind this flexed condition and regular form of the fœtus during labor, to which allusion will be frequently made.

The *weight of the child*, at term, varies exceedingly. Much attention has been paid to this point by various authors; and it may be stated that the average weight of a male child, at term, is eight pounds, that of a female at seven pounds. Children not unfrequently,

however, weigh ten, eleven, or even twelve pounds. It is very rare that this amount is exceeded. In one instance the author found the weight of a female child to amount to thirteen pounds and a quarter. In this case there was not only a large development of the body, but especially of the cranium, the transverse diameter being full four inches, and the bi-temporal diameter being very large, so that there was a great breadth at the forehead, as well as at other portions of the cranium. Wonderful accounts are given of children weighing fifteen or even seventeen pounds; but such accounts must be received with much allowance.

In cases of twins, the combined weight of the children is generally greater than that of a single child,

Fig. 31.



Placenta of Twins.

reaching sometimes to fourteen or fifteen pounds. Each twin usually weighs six or seven pounds, one child being often more fully developed than its fellow. In cases of twins, each child has its own placenta, and its own distinct circulation; but generally these placentæ are conjoined by their edges, forming but one mass, resembling in some degree the figure 8; the line of demarcation is continued by the membranous partition formed by the amnion and chorion of the two ova, each child having its own sac and liquor amnii. Sometimes, however, the placentæ are attached to different portions of the uterus. In one case the author met the placenta of one child at the edge of the os uteri, while the other was attached to the upper part of the uterus. Each placenta, in twins, is comparatively small, while a compound placenta is larger, longer, and heavier than that of a single child.

THE ATTITUDE OF THE FŒTUS.—By this expression is to be understood the position which the fœtus occu-

pies in the cavity of the uterus during the different periods of utero-gestation, or the relation which the extremities or the poles of the ellipse have to the internal surfaces of the uterus.

Every practitioner knows that, during labor, the occipital extremity very generally appears at the os uteri; and statistics have proved that the vertex, or, at any rate, some portion of the head, presents in the proportion of ninety-six to ninety-eight per cent. The great practical advantage of such a presentation to the welfare of the mother, and especially to the safety of the child, is well known, and will be readily perceived in studying the mechanism of labor; but the immediate cause, why this phenomenon is so universal, is by no means easy of explanation, notwithstanding the speculations and positive assertions of obstetric philosophers.

It has been generally maintained in the profession, since the time of Smellie, that the descent of the head toward the lower part of the uterus is owing to *gravity*;

that, as the fœtus floats in the liquor amnii, the heaviest portion will necessarily gravitate toward the lower part of the pelvis and the abdomen; and that the head, from its size and quantity of bone which enters into its formation, would give a preponderance to the cephalic extremity, and determine it to the lower part of the uterus.

In 1833, the distinguished obstetrician of France, M. Dubois, maintained, in an elaborate paper, that gravity would not bring the cephalic extremity toward the lower part of the uterus. He stated that, in various experiments carefully made by immersing a fully developed fœtus in a tub of water, that the lower extremity of the ellipse would descend, *pari passu*, with the upper; that the weight of the liver and lower limbs would counterbalance that of the head; and that the shoulders, or back of the child, would strike first on the bottom of the vessel. M. Dubois, rejecting the theory of gravity, maintained, with much adroitness, that the position assumed by the fœtus was instinctive, or, as he expressed it, an instinctive determination; that, under its influence, the voluntary motions of the fœtus determined the lower extremities of the fœtus toward the upper, or larger portion, of the uterus, where there was more room for their accommodation, and of course the head, or smaller portion of the ovoid of the fœtus, toward the lower or smaller extremity of the uterus. We do not perceive that much light is thrown upon this subject by this attempted explanation. To say that it is an instinctive determination is nothing more than the philosophical mode of asserting a matter of fact, which experience proves to be advantageous.

Professor Simpson, of Edinburgh, has elaborately examined this subject. He acknowledges, with Dubois, the great importance of the muscular movements of the fetus in determining its attitude; but he denies, on good grounds, we think, that these movements are voluntary, or even instinctive. He dwells upon the fact that fœtuses without brains, and even without heads, nevertheless move readily in the cavity of the uterus, of course without any exercise of volition. He contends, therefore, that the fœtal movements are "excito-motory," or "spinal;" that the impression made on the "incidental nerves" is propagated to the spinal marrow, and, by a reflex influence, to the muscles; that the susceptibility of various tissues is different; that in the fœtus this susceptibility is comparatively great in the skin, and upon some portions of it more than upon others, as on the lower extremities. Hence he infers that muscular motions being excited, the large extremity of the ovoid of the fœtus (pelvis and lower extremities) will be necessarily determined to the upper

part of the uterus, where there is more room, of course securing a dependent position to the head; and hence, also, if accidentally there should be any displacement of the fœtus, these excito-motory actions will replace the fœtus in a proper position.

We do not perceive that there is any difference, except a physiological one, between the explanation given by Dubois and that by Simpson; for they both in reality maintain that muscular movement is the cause of the frequency of cephalic presentations, although they differ as to the point, whether they are cerebral and voluntary, or whether spinal and excito-motory.

That the head presents most frequently when the muscular contractions are most frequent, and when there is comparatively little liquor amnii, Professor Simpson endeavors still further to elucidate and enforce by reference to statistics. These statements are interesting, and, as they may be of some practical importance, we subjoin the following table, indicative of the variety of presentations in cases of abortion, of premature labor, and of labor at term:—

Table of the Relative Proportions of Head Presentations, as varied by the date of the Pregnancy or Labor.

Period of Pregnancy.	Total Cases.	Presentations of			Percentage of Head Presentations.
		Shoulder.	Breech.	Head.	
Before end of sixth month,	121	5	51	65	52 in 100
During seventh month,	119	6	31	82	68 in 100
During eighth and ninth months,	96	2	22	72	76 in 100
At full term of gestation,	100	1	3	96	96 in 100

(After Simpson, from Dubois' Cases at the Maternity Hospital.)

Even giving full weight to the above statement, we do not perceive that it proves the paramount importance of fœtal movements in determining the attitude of the child; for in all instances there is at least a majority of cephalic presentations, and this majority is sometimes as great as eighty-two per cent., even in cases of dead children, as reported also by Dr. Simpson, where of course no muscular agency is concerned. This fact alone, we think, proves that there must be some more positive cause than fœtal motion to account for the general fact as to the predominance of cephalic presentations.

M. Cazeaux cannot coincide in opinion with his friend, M. Dubois, but ventures the supposition that the position of the child depends upon the form of the uterus, which organ being larger above, better accommodates the large ovoid extremity of the fœtus, while the head, or smaller portion, is determined toward the inferior or contracted portion of the uterus. In this idea he is supported by several authors, and also by the state-

ment generally believed, that in transverse positions of the fœtus the long diameter of the uterus is from side to side, and not from above downward.

It is probable, however, that the attitude of the child in utero, with the head pendant, is determined, not by one cause only, but by the conjoint influence of several, as first, and perhaps mainly, on *gravity*. For, although the experiment of Dubois, by immersing a child at the full period in water, may prove that at this time the head is not positively heavier than the pelvis, yet this does not apply to children under six months, where the pelvis and lower extremities are comparatively less developed than the head; and we all know that in the embryotic condition there is a greater comparative size of the cephalic vesicle, which, therefore, sinks to a lower position when immersed. It is the opinion also of such authorities as Velpeau, Moreau, Baudelocque, Capuron, and Madame Boivin, that this is the usual position of the cephalic extremity during the whole period of gestation, inasmuch as in post-mortem examinations during the earlier stages of pregnancy the head is very frequently found dependent, and, in a majority of cases of abortions, the presentation is cephalic. This is in unison with our own experience. There is no doubt, however, as appears from the above table, that mal-presentations are much more frequent in the earlier than in the latter stages of gestation, arising from many causes more or less apparent. Making allowance, therefore, for the influence of such disturbing causes, and also bearing in mind that the fœtus, prior to the seventh month, floats in a large quantity of liquor amnii, we have an adequate explanation why mal-presentations are more frequent in abortions and premature births than at the full period, while the influence of gravity is decidedly manifested in giving at all times a preponderance to cephalic presentations.

We think also with Velpeau that the floating of a fœtus, as done by Dubois, in a vessel of water, is different, in several respects, from its condition in utero, where the walls are not merely convergent, but are capable of contraction, and otherwise modifying the position of the fœtus. We must believe, therefore, that gravity is one very important element in securing the cephalic presentation of the fœtal ellipse.

Changes in the attitude of the fœtus become more difficult after the sixth month, as then the child increases rapidly in size, while the quantity of liquor amnii, and the consequent size of the uterus, are not proportionably augmented. Hence a cephalic presentation toward term is very seldom changed.

Second. *The Form of the Uterus*.—Cazeaux and many others incline to the opinion that the most influ-

ential circumstance regulating the attitude of the fœtus is the shape of the uterus, which being ovoid, the lower extremities and the pelvis of the child are better accommodated toward the superior or greater extremity of the uterus, and that the head, therefore, descends toward the cervix uteri. This is perfectly reasonable, and is in accordance with other arrangements in the animal system, whereby the containing and contained parts are so perfectly accommodated to each other that no space is unnecessarily lost.

Third. *Muscular Movement*.—The motions of the fœtus, as supposed by Dubois and Simpson, whether they be instinctive, voluntary, or purely automatic or excito-motory, must influence very much the attitude of the fœtus in utero. Every accoucheur, at the commencement of labor, has noticed not merely the motions of the fœtus, but changes in its position, and even presentation. It seems, therefore, as a matter of course, that, as there is great activity in the lower extremities of the fœtus, in the way of flexion and extension, that this must necessarily determine the pelvic extremity of the child toward that part of the organ, where there is more room for the large extremity of the fœtal ovoid, and for the movement of the lower extremities. We can easily imagine, for example, that if a fœtus at the sixth month were floating in the quiescent condition transversely in the liquor amnii, and much action of the lower limbs be excited, the head will be necessarily determined to the inferior rather than to the superior extremity of the conoid cavity of the uterus.

Although gravity, therefore, and the form of the uterus may be sufficient, in a large majority of cases, to determine the head toward the cervix uteri in the proportion of eighty-two per cent., as in cases of dead children, yet the greater frequency of cephalic presentations—equal to ninety-six per cent. in living children—may be satisfactorily explained by this additional agent—muscular contractions of the fœtus.

Misplacements of the Fœtus may exist at any period of pregnancy; even at the full period they are observed in the proportion of four in a hundred cases.

The causes of the misplacement of the fœtal ellipse are numerous, as,

First. *The form of the uterus*. Wiegand asserts that in transverse presentations the long diameter of the uterus is from side to side, necessarily giving an oblique or transverse position to the fœtus. So also, if the form of the uterus be altered by positive irregular contractions of this organ, by the existence of tumors in its cavity, in its walls, or even externally, or it may be by deformities of the pelvis, of the spinal column, or of the thorax—the position of the child in utero may become changed.

Second. *Displacements of the uterus during the latter periods of pregnancy.* In normal gestation the axis of the uterus, of the ovoid of the child, and of the superior strait of the pelvis, should nearly correspond. Hence, if the uterus become oblique to the pelvis, an obliquity may also be caused by the child's moving with the uterus; or, in some instances, when the uterus is oblique, the axis of the child may still correspond to that of the pelvis. In either case mal-presentation, when labor ensues, may be detected. Authors generally, indeed, mention such obliquities as being the common cause of mal-presentations.

Third. *Motions of the fœtus.* If these be conducive to produce and maintain, in most cases, a favorable attitude to the child; yet, we think, they are often also productive of mal-position or presentation.

Motions of the child in utero are sometimes very active—such as flexion and extension of the head, as well as of the extremities, rotation on its own axis, partial or complete version in utero—all which can be readily demonstrated by internal and external examination, by auscultation, and by noting the conditions of the umbilical cord after delivery. This is sometimes found encircling the body, and more frequently the neck of the child, even as often as twice or three times. Occasionally, also, complete knots or nooses will be found in the cord, which can only be explained by the supposition that the child has passed through a duplicature of the cord. Hence, if the membranes should be broken, and the liquor amnii be evacuated at the moment when such changes are taking place in the position of the fœtus, mal-presentations will often be found. This fact explains why such mal-presentations are more frequent prior to the seventh month of utero-gestation, when the child is still movable; while at the eighth or ninth month the uterus is comparatively too small to permit such changes to be effected. There can be little doubt, also, as Dr. Simpson supposes, that if the membranes be not ruptured, the motions of the child may again correct its position, and reproduce a normal presentation. All such changes in the attitude of the fœtus will be greatly facilitated when a large quantity of the liquor amnii is present, and also during the middle period of gestation, when the form of the uterus is more spheroid.

Fourth. *The death of the fœtus.* This seems, in some degree, to favor mal-presentation, even at term. As we have already remarked, it is probably owing to the suspension of muscular action; but it depends also, we think, upon other causes. A dead infant presupposes a premature one very generally. The child often dies some weeks, if not months, before labor

occurs, and hence the size of the child is small compared with the size of the uterus, and with the quantity of liquor amnii present. Another reason is, that a dead child is more under the influence of the various positions assumed by the parent; the patient herself recognizing it in many instances;—a dead fœtus falling from one side to the other as she changes her own position.

Fifth. *Immaturity of the fœtus.* The fact, that owing to the large proportional quantity of liquor amnii in the earlier stages of pregnancy, the attitude of the embryo and fœtus can readily be disturbed; it follows that if the membranes should be ruptured during the existence of any such disturbance, in its position, the fœtus would often be fixed by the contractions of the organ, and a mal-presentation would be detected during delivery.

Sixth. *Physical or accidental causes.* Falls, blows, or any external violence, may, doubtless, in some cases, disturb the attitude of the fœtus in utero during the earlier stages of pregnancy, so that mal-presentation may be found, if labor be at the same time induced. Many such displacements, however, are doubtless rectified through the influence of gravity, fœtal motions, etc.

In the two or three latter months of pregnancy such physical causes can have but little influence, as the child is too large to turn in utero.

Seventh. *Deformities of the fœtus.* When the head is unusually large, as in case of hydrocephalic children, mal-presentations are more frequent. This is owing, doubtless, to the fact that the head would be better accommodated toward the upper or large portion of the uterus, as it now constitutes the large extremity of the fœtal ovoid.

This subject of derangement in the attitude of the fœtus will be occasionally resumed when we describe the several mal-presentations and positions of the fœtus during labor.

SUPERFÆTATION.—There is connected with the subject of the development of the ovum and its contents another question of some practical importance, Can a woman conceive when she is pregnant? In other words, if an ovum be fecundated, can a second ovum be impregnated in consequence of a subsequent coition? Most women are anxious upon this subject, and occasionally it becomes a question even of legal importance, involving the character of the woman and the happiness of her family.

We have no hesitation in declaring that superfœtation, in its strict definition, never occurs; the exceptions, if any, are certainly very rare. Almost all the

cases paraded by the older, and even by some recent authors, can be satisfactorily explained. All our anatomical knowledge of the gravid uterus would indicate the impossibility of superfœtation, certainly after the first week or ten days. It is at this period that the ovum descends into the uterus; this body and its appendages so occupy the cavity of the uterus, and cover its orifices, namely, the internal os uteri and the opening of each Fallopian tube, that there can be no access for the semen to the cavity of this body, and, therefore, to the Fallopian tubes and ovaries.

In the opinion of all those who believe that a membrana decidua is formed on the internal surface of the uterus prior to the descent of the ovum, superfœtation would also be considered as impossible after the second or third day of impregnation. Even those physiologists, who deny the formation of any new membrane, are generally of the same opinion; inasmuch as the swelling and turgescence of the mucous membrane, its convolutions and folds, and especially its tumefaction at the orifices of the Fallopian tubes, would effectually prevent the access of the spermatozooids to these tubes, and, of course, to the ovaries. If such obstruction did not exist, it is almost inconceivable why the delicate ovule, after it enters the uterus, should not escape through the still patulous orifice of the internal os uteri. In every point of view, as far as our knowledge still extends, superfœtation is impossible, unless a subsequent coition is accomplished very soon after conception, that is, before there is any formation of a membrana decidua, or any great turgescence of the mucous membrane.

In this very limited sense, facts fully substantiated prove the possibility of secondary fecundation. In Montgomery County, near Philadelphia, a young woman was delivered of two children, one white, the other a mulatto. She acknowledged a connection with a white, and afterward with a negro man a short time subsequently. A similar case occurred in Charleston, S. C., where the woman acknowledged having had intercourse with a black man within half an hour after her husband had left her. Dr. Henry, of Brazil, S. A., details a still more surprising example of a native woman delivered of three children, one white, a second brown, and a third black; each child exhibiting the features peculiar to the respective races, European, Indian, and African.

Similar facts are abundantly corroborative of the possibility of a secondary conception, and they excite a suspicion that pregnancies of two or more children are not always the result of a single congress.

Facts, similar to those just recorded, are met with among the lower order of animals. A mare covered by

a stallion, was soon afterward covered by an ass, and was delivered at her full period of a horse and a mule. Many similar cases are recorded.

Most of the alleged examples of superfœtation can, says M. Velpeau, be very readily explained: as,

First. The unequal development of twin children is by no means uncommon. A woman delivered at term of one child fully developed and vigorous, and also of a second comparatively small and feeble, has induced suspicion that the second infant was the result of a coitus during the second or third months of gestation. Such instances cannot be relied upon as proofs of superfœtation, as it is well known that in single births at term the child has often similar marks of immaturity.

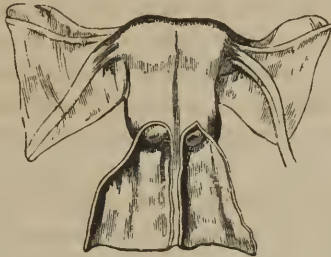
Second. The retention of a dead fœtus within the uterus may occur in cases of compound pregnancy. There are many cases upon record where a dead child has, in such instances, been carried even seven or eight months, and yet its twin been born in full health and vigor at term. Although it is true, as Mr. Burns would express it, that when a fœtus dies "the action of gestation" is arrested, and the "action of contraction" or "expulsion" begins, yet there are numerous exceptions, in single as well as in compound pregnancies. In several instances of single pregnancies the author has known of fœtuses dying at six or seven months, and being carried to the full period, when evidences were presented that the placenta, as well as the fœtus, had perished. In other cases, although the child dies, the placenta survives, becomes altered in its structure, and is thrown off at the end of the eighth or ninth month; while, in other cases, the whole ovum maintains its vitality, although the embryo be dead. This is remarkably the case where the membranes are covered with hydatids. The author has met with a case where there was no vestige of the embryo, but where a large mass of the hydatid membranes was expelled at the sixth month of utero-gestation, preceded and accompanied by hemorrhage. In similar cases a small dead fœtus has sometimes been detected.

In compound pregnancies the same fact has been often verified. Both children have sometimes perished a longer or shorter time before labor; while, in many, one dies and its fellow is retained until it is fully developed.

Third. There are other cases very analogous to the former, but still more extraordinary. A woman may have an abortion, or premature labor of one child, while a second is retained in health, and is delivered at term. Dr. Simpson mentions a remarkable case of a woman aborting at three months, and being delivered at term of two children.

Fourth. Another apparent exception may be explained by the existence of a "double uterus," as it has been termed. This malformation is exceedingly rare, and, strictly, has perhaps never occurred. Those examples which are upon record are generally instances of a bi-horned uterus, the organ consisting of two portions, right and left. Sometimes there is a common os uteri;

Fig. 32.



Double Uterus.

occasionally each has its own orifice, while there is but one Fallopian tube and ovary to each horn. In the Wistar and Horner Museum of the University of Pennsylvania there is preserved a specimen of a "bi-horned" uterus, with one vaginal orifice. In other instances, the uterus appears to be single, but there is a membranous or fleshy partition, which divides the cavity into two parts. It is possible, therefore, where this deformity exists, that, while one ovum may occupy one horn of the uterus, fecundation of another germ may take place some weeks or months afterward through the other horn and Fallopian tube. At term the woman may be delivered of a healthy child, and some months afterward of another. "Madame Boivin details a case of a woman delivered on the 15th of March, 1810, of a fœtus weighing four pounds, and on the 12th of May following of a feeble infant, weighing three pounds. The woman assured Madame Boivin that she had no connection with her husband, except thrice, in two months, viz., on the 15th and 20th of July, 1809, and on the 16th of September following." The presumption, therefore, in this case was, that a double uterus existed; especially as the second infant was more immature and more feeble than the first, and as Madame Boivin, after the birth of the first child, could not, per vaginam, detect a second infant.

A more positive case, occurring to Professor Big-nardi, is cited by Dr. Tyler Smith, of a woman who had borne many children, and then on the 15th of February, 1817, was delivered of a child apparently at the full term. On the 14th of March following she gave birth to a second mature child. In 1847 this woman died of apoplexy, and a post-mortem examination revealed the existence of a double uterus, which is still

preserved in the University of Modena. A few other cases equally positive are recorded; but it is asserted that even in cases of double uterus, a second impregnation is exceedingly rare, as both cavities become covered with a membrana decidua, as soon as fecundation of one ovum has occurred, thus preventing a second conception.

Fifth. There can be no doubt that, if a fœtus be developed outside of the uterine cavity, that some months or years after the woman may become again pregnant, and even carry her child to the full period. These cases of extra-uterine pregnancy, however, afford no support to the theory of superfœtation during ordinary uterine gestation.

Very universally, therefore, all the apparent exceptions to the truth that superfœtation is impossible may be explained satisfactorily by one or the other series of facts just detailed.

Nevertheless, it must be acknowledged that a few cases have been recorded, which seem to militate against this truth, and appear true examples of superfœtation. Dr. Churchill details three cases: A lady of Strasburg was delivered on the 30th of April of a "lively" child; on the 17th of September, of the same year, (that is, one hundred and forty days after the first delivery,) she brought forth a second apparently mature and healthy child. She subsequently bore children, and, at her death, the uterus was found single. In the case related by Desgranges, of Lyons, the woman was delivered on the 20th of January, 1780, of a seven months' child, and on July 6th, 1780, (one hundred and sixty-eight days after the former birth,) she gave birth to a second, "which had apparently reached its full time." Dr. Maton records a case of an Italian lady, Mrs. T., who was delivered at Palermo, on the 12th of November, 1807, of a male child; on the 2d of February, 1808, (being eighty-two days subsequently,) she was delivered of a second male infant. "Both the children were born perfect; the first, therefore, could not have been a six months' child."

In addition, Dr. Tyler Smith details a case which he saw, in consultation with Mr. Eardley, where a young married woman, pregnant for the first time, miscarried at the end of the fifth month; and, some hours afterward, a small clot was discharged, including a perfectly fresh and healthy ovum of about one month.

These cases are apparently inexplicable; it may, however, be remembered that in one only was it proved, by a post-mortem examination, that the uterus was single. Upon the supposition, that either of these women conceived after they had been pregnant four or five months, authors have speculated how the sperma-

tozoids could possibly reach the Fallopian tube in the second impregnation. Dr. J. M. Duncan, of Edinburgh, supposes, that the membrana decidua vera has orifices at the os uteri and Fallopian tubes, and that the ovum with the decidua reflexa for three months only occupies one horn of the uterus; and, therefore, there is still a passage through the cavity of the membrana decidua to one Fallopian tube. This supposition has really no foundation, for few experimenters will acknowledge that any such openings exist in the membrana decidua. Moreover, the ovum very universally fills the whole cavity of the uterus long before the end of the third month, and certainly no explanation can thus be offered for superfœtation at the fourth or fifth month of utero-gestation. Other hypotheses might easily be made, such as the unnatural separation of the membrana decidua on one side of the uterus, so as to allow

a passage from the orifice of the uterus to the Fallopian tube; or that the Fallopian tube has an unusual course, either exterior or within the walls of the uterus, so that its orifice might be found in the vagina, or in the internal surface of the cervix uteri. But such speculations are useless, in the absence of any positive demonstration. We must, therefore, reiterate our belief that the few exceptions now mentioned do not invalidate the universal truth that superfœtation does not occur, confirmed, as it is, by the negative experience of almost every married woman. "The exception," if any, "proves the rule." This truth is so important, not merely as regards the physical welfare of the married woman, but also as involving, in some instances, her moral character and her connubial happiness, that it ought not to be denied, excepting on the most positive and best substantiated facts.

CHAPTER V.

THE SYMPTOMS OF PREGNANCY.

THE wonderful changes, to which allusion has been made, occurring within the body of a woman, in consequence of fecundation, and resulting in the formation, progress, and perfection of a new being, must necessarily be manifested by more or less decided phenomena, indicative of these mysterious results. In the early periods of pregnancy no decided diagnosis can be made; the changes are so deep-seated, and so gradual, that few positive symptoms are perceived. It is not long, however, before certain phenomena evince the presence of the embryo, which become more and more decided, as pregnancy advances to the full period of utero-gestation.

The signs of pregnancy must be carefully and minutely studied by the accoucheur, not only for the satisfaction of himself and his patient, to whom such knowledge is all-important, but for the purpose of differential diagnosis. There are many diseases of the uterus and its appendages, and indeed of other viscera in the cavity of the abdomen, which may be mistaken for pregnancy or complicated with it, and which it is essential to distinguish from gestation. So many sad mistakes have been made that it behooves every practitioner to prepare himself in the best manner to deter-

mine the existence or non-existence of pregnancy in any particular case. It may be observed also that all his acumen will be frequently taxed by women who feign gestation when it does not exist, or deny its possibility when it has actually occurred.

The practitioner should, in every case of suspected pregnancy, realize the responsibility he incurs of giving an opinion as to the condition of his patient, as such opinions must often involve the happiness and character of individuals and families. In some instances, the question will become the subject of judicial investigation, respecting the legitimacy of the child, and, of course, its legal rights.

The symptoms or signs of pregnancy are usually divided under the two general heads of the *Sensible* and *Rational*.

SENSIBLE SIGNS.—Under the head of *Sensible Signs*, may be arranged: 1st. A disappearance of the menses. 2d. Changes in the mammæ. 3d. Changes in the nipple and areola. 4th. Changes in the uterus, as already alluded to, and consequential changes in the form and carriage of the woman. 5th. The sensations produced by the balancing of the uterus, or its *ballotte-*

ment. 6th. Quickening, or the perceptions of the motions of the child. 7th. The sounds to be heard by auscultation. 8th. The changes in the color of the vagina. 9th. Changes in the condition of the urine.

After the fourth month, these sensible signs, when taken in combination, indicate very positively the existence of pregnancy; but prior to that period, although they may afford strong presumptive evidence of the existence of gestation, they are not so positive but that mistakes may occur.

First. *Absence of the Menses.*—The non-appearance of the menses at their expected periods in married women in good health and strength, and who have been previously regular, may be regarded as a very positive sign of pregnancy.

Every practitioner is aware that the function of menstruation is easily disturbed, and, therefore, the non-recurrence of this secretion must not be regarded as an infallible sign of fecundation. Nevertheless, under the circumstances just mentioned of healthy married women, if the menses do not occur about the time expected, experience proves that it is very generally owing to conception having ensued.

Fecundation may, however, occur, and yet the menses may continue; and, in some extraordinary instances, women are said to be regular, both as to time and quantity, during the whole period of gestation. In other cases, menstruation returns for three or four months only. In a large majority of cases, however, where the menses occur during pregnancy, it is but once or twice; the quantity is small, and the period much diminished, continuing only for one or two days. The cavity of the body of the uterus being occupied by the ovum, it would seem impossible that any discharge should occur from this portion of the internal surface. The menses, under these circumstances, are supposed to proceed from the mucous membrane of the cervix only. This will explain the fact, that the discharge is usually small, and of short continuance; a more free discharge, however, may issue from the cervix, in consequence of unusual turgescence of the uterine vessels. As to the reputed free menstruation to the full period of utero-gestation, we acknowledge that we have always been skeptical; for, although we, as well as others, have met with bloody discharges at intervals, more or less regular, yet we regard them as hemorrhagic, rather than menstrual, as abnormal rather than normal; and, therefore, as threatening abortion or premature labor, which, not unfrequently, is the sequel of such irregularities. Certainly in practice this view of the subject ought to be the guide of the physician. Probably the accurate and experienced observer, Dr. Denman, took this view of the subject, when he declared

he had never seen menstruation during pregnancy; but, doubtless, he must have met with sanguineous discharges very frequently, which he could not regard as proper menstruation.

The accoucheur must, however, be careful in giving a positive opinion as to the condition of his patient, simply from the fact, that the catamenia have not made their usual appearance, for it is well known that numerous causes, external and internal, may interrupt menstruation. In a few cases conception has taken place among girls, even before any discharge has been observed. In many women, also, even when their general health is apparently good, the menses are very irregular, not appearing, except at intervals of four or five months, sometimes even longer; in such cases, although conception does not usually occur, yet occasionally it may—so that distension of the abdomen, or quickening, excite the first suspicions of pregnancy. A lady under the care of the author, whose periodical visitations occurred only once or twice a year, and whose general health was delicate, became pregnant seven months after the last appearance of the menses, and six years after marriage.

During lactation, it is a general law of the animal economy that fecundation does not take place, and hence comparatively few females conceive within nine or twelve months after the birth of an infant, and some are secure until after weaning. Exceptions, however, to this rule are very numerous, and hence no positive expression of opinion upon this point can be given in individual cases.

Idiosyncrasies of a still more extraordinary character are reported to have existed. Deventer, Baudelocque, Chambon, Meurer, and Dewees mention cases where women never menstruated, except when pregnant. It might be asked, whether the bloody discharge, under these circumstances, was truly menstrual.

Second. *Changes in the Mammæ.*—These may be regarded as the second in order of occurrence of the sensible signs of pregnancy. Very soon after the menses disappear the breasts become more full and more sensitive, which phenomena gradually increase, with some variations, to the full period of gestation. This enlargement is similar in both breasts, and the increased tenderness is often great. On examination, it will be found that the proper glandular tissue of the breast is involved in its general turgescence, and is evidently accompanied with increased vascular excitement, manifested not only by the swelling, and the increased heat and sensibility of the parts, but by the rapid development of the superficial veins, which are often very visible in their ramifications under the cutaneous tissue.

Toward the seventh or eighth month of pregnancy

seroid or milky discharges exude from the nipple, and in some women, during the latter weeks become very profuse.

Much importance may, therefore, be attached to the regular equable development of both mammae as a sign of pregnancy; but it must be remembered that in cases of uterine irritation from displacements of this organ, from tumors, and other causes, similar excitement and congestion of the mammae may be found.

The excretion of a milky fluid must not be considered as positive, especially in females who have borne children. A Mrs. R., for example, insisted she had milk in her breasts even for twelve years after the birth of her child. Milk also has been found in the breasts of virgins, and even of very young girls, the flow being produced by frequent "titillation" or by the application of an infant to the nipple. Thus Baudelocque details the case of a girl, eight years of age, in whom the secretion was abundant, as was demonstrated by the child herself when presented before the Academy of Surgery, in October, 1783. It has been said that milk has been found even in the breasts of adult males.

In his diagnosis of pregnancy, the practitioner must not be deceived by rapid development of the breast often occurring in young married women long before fecundation has ensued. On the other hand, gestation not unfrequently exists where there is very little, if any, enlargement of the mammae, and no secretion or excretion of a milky fluid. In some women, also, even after parturition, there is a very imperfect development of the breasts, and the natural secretion is trifling.

Connected with the enlargement of the breasts, especially when it occurs rapidly in young women, little smooth, bright lines are observed in the skin, sometimes quite broad, resembling cicatrices, and analogous to similar appearances very frequently observable in the skin of the abdomen during pregnancy; like these, also, they are generally permanent. In some few cases of women who have never borne children, such lines may also be noticed, when there has been great development of adipose tissue.

Third. *Changes in the Papilla or Mammelon and in the Areola.*—Attendant upon the development of the mammae are corresponding changes in the nipple or papilla, and also in the areola. In the virgin, the nipple is short, often partially imbedded in the breast, and with the areola of a very delicate pink color. After fecundation, the nipple becomes turgid, and hence enlarged and prominent; the color deepens, and the surface becomes more rugose. This development increases as pregnancy advances, owing, not merely to increased activity of the circulation, but also to the development

of the lactiferous tubes, sometimes to such an extent as to allow the abundant excretion of a milky fluid.

The *areola*, which, in the virgin state, is very small, and, like the nipple, of a delicate pink color, also enlarges in proportion to the development of the nipple; its diameter augments from half an inch or three-quarters, to two and two and a half inches, while its color deepens, becomes brownish, and, in females of a dark complexion, this brown color is greatly enhanced. This tissue becomes elevated, soft, and puffy; this "puffy" character of the areola Mr. Montgomery considers one of the surest signs of pregnancy, especially in a primiparous female. It is related of Mr. John Hunter that, from this sign alone, he declared that a young girl, whose body was prepared for a post-mortem examination, was pregnant, although the hymen in the same case was reported as perfect. On examination, an embryo was discovered in the uterus.

The follicular glands, or sebaceous follicles, fifteen or twenty in number, around the nipple, are also much developed, becoming elevated from the one-tenth to the one-eighth of an inch.

These changes in the nipple and areola are certainly very strong indications of conception, especially in young women; in females who have borne children they are less reliable, as when these developments have once occurred, although they are diminished after delivery, yet these tissues never return to their virgin condition.

In some women, little brown spots, toward the fifth or sixth month, are observable around the areola, and occasionally extend over the whole mammae. These have been called "secondary areolæ." They are not very common, and are, therefore, uncertain in a diagnostic point of view. Montgomery, however, seems to consider their presence as exclusively the result of pregnancy, and, therefore, valuable.

The practitioner must not, however, rely too confidently on the condition of these tissues, as occasionally the changes are very trifling, and, in some instances, as in a case which occurred to M. Cazeaux, in 1837, no change was observed, even to the full period of gestation.

Dr. Dewees also informs us that females can, by handling and friction, so excite the nerves and blood-vessels of the papilla and areola, as to alter their virgin appearance, and that this is sometimes done for the purpose of deception.

Fourth. *Enlargement of the Abdomen, etc.*—During gestation the form and size of the abdomen are necessarily altered in proportion to the development of the uterus and its contents.

It may be remarked that, after marriage, there is

often a rapid change in the general character and appearance of the female, which may give rise to the suspicion of pregnancy, when no fecundation has really occurred. This is especially observable in young girls, where the general signs of puberty have not been fully established. Care, therefore, must be taken not to confound such cases of rapid development, after marriage, with the peculiar changes consequent upon gestation.

After conception and the consequent uterine development, there is a gradual enlargement of the whole lower part of the body, not merely of the hypogastric region, but also in the direction of the sides and nates. As pregnancy advances, these developments augment, but, of course, they are chiefly manifested first in the lower portions of the abdomen, and, subsequently, over its whole extent. The woman is conscious of a sense of fulness, weight, and pressure, and often perceives an increase in the size of her waist; her garments becoming too tight and oppressive, even before she notices any swelling in the abdomen. The subsequent distension may be, in general, regarded as proportionate to the development of the uterus. Much, however, depends upon the size and height of the woman, her degree of emaciation or obesity, upon gaseous or feculent accumulations in the bowels, upon diseases of the liver, spleen, or other viscera, upon the presence of preternatural tumors or dropsical effusions, the existence of deformities, etc.

The enlargement of the abdomen also depends upon the quantity of the liquor amnii, the size of the child, and whether it be a single or compound pregnancy. In primiparous patients, where the abdominal muscles are tense, the distension is said to be less; the child is "carried higher," and the woman is comparatively small. In multiparous patients, where the abdominal muscles are relaxed, the uterus falls more forward, she "carries" the child "lower," so that at the full period of pregnancy the distension of the hypogastric region is very great, accompanied with an anterior obliquity of the uterus; the patient being unable to stand or move with comfort.

The apparent size of women, during gestation, varies also according to their stature; tall women appearing to be small, and short women large. Much depends, also, upon the carriage of the woman: those who walk very erect, and throw their shoulders backward, necessarily render the abdomen very prominent; while others may often deceive even the practiced eye, by inclining the chest forward, and throwing the nates backward.

In all cases the perpendicular diameter of the abdomen is elongated, the pubis descending, and the thorax being elevated; thus the obliquity of the pelvis is aug-

mented by pregnancy, and there is a greater anterior convexity of the lumbar vertebræ; the "hollow of the back" is increased.

As a diagnostic sign of pregnancy, in young and healthy women, much may be learned by observing the regular developments of the uterus at the different stages of gestation. During the first and second months, there is no apparent enlargement of the abdomen to the patient, or even to the physician, although there is a decided augmentation of the uterus itself. Most practitioners have even declared that the hypogastric region is less tumored, and even flatter than before conception. We acknowledge that we never could perceive any such flatness, neither can we believe in its occurrence, inasmuch as the enlarged uterus occupies more of the cavity of the pelvis, and the small intestines are, therefore, pushed up, and not unfrequently render the lower part of the abdomen somewhat fuller. Practitioners who think they have noticed the flatness of the abdomen, have endeavored to explain this phenomenon by the fact, that there is generally some prolapsus of the uterus in the early stages. This attempted explanation is as erroneous as the original statement, because in cases of prolapsus or retroversion in the unimpregnated state, no such flatness of the abdomen has been observed; neither, indeed, could it well occur, for, although the organ is displaced, yet the cavity of the pelvis is as much occupied by the bladder, uterus, and intestines, as if no such displacement existed. It is only in cases of procidentia uteri that there is any tendency to vacuity. Moreover, during pregnancy the uterus, although somewhat prolapsed, as recognized by the position of the cervix, nevertheless occupies a larger portion of the pelvis; its fundus seldom being lower, and often higher than in the unimpregnated state. Hence, but a small portion of the intestines can descend into the pelvis. So far, therefore, from there being any flatness of the abdomen, there is, in reality, a greater fulness, often, indeed, to be recognized by the observing practitioner, especially if he has had the opportunity of examining the same woman before and after fecundation.

At the end of the third month of gestation, this tumefaction is more decided, and sometimes obvious to the patient, in the hypogastric region. This is evidently owing to the cavity of the pelvis being so much occupied by the enlarged uterus, that little room remains for the intestines, which, being pushed up, necessarily increases the protuberance of the abdominal walls.

Even in women of some corpulency, the fundus of the uterus can now be recognized above the superior strait, to an extent varying exceedingly in different individuals, according to the size of the pelvis, the de-

velopments of the uterus, and other circumstances. It is rare that a patient can herself recognize any hard swelling.

On examination per vaginam, the prolapsus of the uterus has usually disappeared, and the cervix is toward the centre of the pelvis.

At the end of the fourth month, the turgescence and hardness of the lower part of the abdomen is generally perceptible, even to the woman herself. The practitioner perceives an hemispherical tumor extending some two and a half inches above the pubis, nearly or quite half-way between the pubis and umbilicus. This is the fundus uteri; upon examination it will be found that the pelvis is much less occupied, and the cervix inclining more toward the sacrum. The common expression is, that the uterus has risen out of the pelvis. This, however, must be received under proper restrictions, for, of course, the whole uterus has not risen; part of it continues to project into the pelvis, even to the full period of gestation. All that is meant by the rising of the uterus, at or about the sixteenth week of pregnancy, is, that the largest portion of the uterus, which is represented by the circumference on a level with the Fallopian tubes, is above the linea ileopectinea.

At the end of the fifth month, the fundus of the uterus can be detected a little below the navel, and its anterior surface, directly above the pubis; the whole of the abdominal cavity being decidedly tumid, so that there is even an enlargement in a transverse direction of the base of the thorax.

At the end of the sixth month, the fundus of the uterus has reached the navel, its size and that of the abdomen being evidently augmented.

At the end of the seventh month, the fundus is some three inches above the umbilicus; the iliac fossæ are partially occupied by the distended organ.

At the end of the eighth month, the fundus has reached the epigastric region, and its sides come in contact with the lower convex margin of the thorax, augmenting the transverse diameter, while the protuberance of the abdominal walls is very conspicuous.

At the end of the ninth month of gestation, there is very little further elevation of the uterus; sometimes the fundus projects a little more into the epigastric region, but usually the resistance of the thorax causes the fundus and whole body of the uterus to project more anteriorly, rapidly increasing during the ninth month the apparent size of the woman. At this time the os uteri may be found far back in the pelvis, the cervix has usually disappeared, and a tumor is formed by the presenting part of the child, to be felt between the os uteri and the pubis. This, however, is not

always observable, even in cases of cephalic presentations.

During the last two weeks of utero-gestation it is frequently observed that the lower part of the uterus, enclosing the head or some other portion of the child, becomes more conical, and descends somewhat into the pelvis; this is more frequently the case where the pelvis is comparatively large, and where there is a great deal of pressure from above. When the uterus is thus low it may be considered as indicative of the approach of labor.

The regularity of the form, size, and position of the uterus, as felt through the parietes of the abdomen, and its regular stages of increment, are very important in establishing the existence of pregnancy, and especially in distinguishing these physiological changes from all the varieties of morbid growths of the uterus, of ovarian or other tumors often existent in the cavity of the abdomen.

The differential diagnosis is, however, very difficult in cases of abdominal swellings, especially as in all cases, unless where there be great emaciation, the exercise of the sense of touch is impeded by the resistance of the abdominal walls, and the general fulness of the abdomen, and also as pregnancy is very frequently complicated with some morbid state of the tissues, or viscera of the abdomen. It behooves the practitioner, therefore, to be very careful and precise in all his examinations, and very cautious in delivering a positive opinion: the most experienced men have been deceived, and most serious consequences have resulted from a false diagnosis. The most common, perhaps, of these mistakes, is that of confounding pregnancy with dropsy, and hence resorting to active evacuating measures, or even to the operation of paracentesis abdominis, to the injury or destruction of the child and its parent.

During the development of the uterus after the fourth month of gestation, as the abdominal walls become more and more extended, the texture of the skin becomes altered. Portions of it seem to yield, so that white lines or smooth polished marks, similar to cicatrices, are very generally formed, especially in first pregnancies. They are certainly not characteristic of pregnancy, as they may be produced by any great distension of the abdomen, from dropsies, tumors, etc.

The *superficial veins* of the abdomen are at first more visible, and afterward little grooves or canals can often be felt indicating their course.

The *color of the skin* is generally altered, becoming more sallow; often a brownish-colored band is observed extending upward from the pubis over the linea alba, to and even around the umbilicus, and is considered by many as a very decided indication of pregnancy.

The *umbilicus* varies exceedingly in its appearance; few or no changes occur in the early months, although some authors have imagined that it becomes deeper, as they suppose from the depression of the uterus in the pelvis, drawing with it the bladder and its ligamentous attachments to the umbilicus; but as such attachments can seldom, if ever, be demonstrated, the theory and explanation alike fail. After the fourth month of utero-gestation the depression of the umbilicus diminishes, and by the fifth or sixth month has entirely disappeared, the umbilicus being flat. At the sixth or seventh month the skin is not unfrequently protuberant, the navel is said to be prominent, or "pouting," and sometimes the orifice of the umbilicus in the tendons open, so that even a portion of the intestines or omentum may escape, causing what is termed umbilical hernia. In a few very rare cases other portions of the abdominal walls may yield, allowing a partial protrusion of the intestines, forming what is called ventral hernia.

It is well for the accoucheur to observe that the "carriage" and "walk" of the pregnant woman, especially during the last months of gestation, are necessarily altered; to maintain a proper balance she must incline the thorax very much forward, while the nates are proportionally projected backward, or else the whole thoracic region is thrown back, so as to form an equipoise to the abdominal tumor. Hence, some women have a remarkably erect posture, while others bend forward to a considerable degree while walking. It will be found, also, that the lower limbs are separated more than usual, so that the natural "sideling" or vacillating motion is increased, rendering their steps less firm and secure.

The various changes which occur in the uterus during the progress of pregnancy are to be ascertained by careful examinations made with the finger or the hand. These examinations are made *externally* through the parietes of the abdomen, or *internally*, as regards the pelvis, through the medium of the vagina or rectum. The latter or internal examination is generally termed the "touch," and is indispensable wherever any information is required respecting the pelvis or its contents, whether in the pregnant or unimpregnated condition of the woman. The sense of touch, therefore, is as important to the accoucheur as the lever to the mechanic, or the compass to the mariner; and should be cultivated, with the greatest assiduity by every practitioner.

In performing an operation, so offensive to female delicacy, the greatest attention should be paid to the rules of propriety, which should always characterize the truly scientific obstetrician.

The position of the female may be upon her side or back; the former is, in some instances, preferable, as perhaps less unpleasant to the patient, and as it will enable the practitioner to carry the finger deeper toward the posterior portions of the pelvis, and thus extend the sphere of his diagnosis. When this posture is chosen, the patient should be placed upon the left side, provided the practitioner employs his right hand. The patient should be bent forward, and the lower extremities flexed upon the abdomen, and upon each other, while the nates should be brought near to the edge of the bed to facilitate the investigation.

Occasionally this position on the side may be advantageous in an external examination, as sometimes tumors or irregularities may be detected in the abdomen in this position, which cannot be felt when the body is supine.

In a large majority of cases, however, we prefer placing the patient upon her back, the shoulders elevated, the limbs drawn up toward the abdomen, and the feet resting upon the lower part of the bed, so as to bring the pelvis and abdomen near to the practitioner. The advantages of this position are, that the external and internal examinations can be simultaneously made, which is often of great importance. The viscera of the abdomen and pelvis are not in any degree displaced, but will retain their normal relations to each other and to the bones of the pelvis, which is not the case when the patient is upon her side, the weight of the viscera determining the uterus, intestines, etc., from the median line to the lateral portions of the body. A more exact idea can be formed of the ascent or descent of the uterus, and of the relative position of the viscus, as regards the bladder, rectum, and walls of the pelvis.

A vaginal examination is that which is generally made, and is by far the most important; care should be taken not to irritate or give pain, by having the tissues well anointed, by carrying the posterior surface of the finger toward the perineum, and gradually separating the labia, until the point of the finger reaches the orifice of the vagina, into which it is advanced in the direction of the axis of the tube, and hence downward and backward, the patient being supine; while the remaining fingers of the practitioner rest against the perineum. The slow and careful examination of the whole cavity of the pelvis, whether in a normal or abnormal state, can now be carefully instituted. While this vaginal examination is progressing, much additional knowledge can be obtained, especially as to the size and position of the uterus, by placing the other hand upon the abdomen and pressing the fingers gently but firmly over the surface. The patient, through timidity or igno-

rance, often resists this mode of exploration, by holding the breath, and rendering the abdominal muscles tense. This, however, soon disappears, if the practitioner be gentle, and exhorts his patient to breathe easily and rapidly.

The examination, *per rectum*, although unpleasant to the woman, is occasionally requisite, especially to ascertain, not only the condition of this intestine, but also whether the fundus of the uterus, any ovarian or other tumor, is pressing on the posterior part of the pelvis. It will generally be found useful to introduce, at the same time, the index of the left hand into the vagina, so as to verify the position of the cervix uteri, etc.

Fifth. *Ballottement*.—During the third month of utero-gestation, before the patient is conscious of any peculiar change in her condition, the accoucheur can often recognize, not merely the developments of the uterus, but that there is also a body floating in its cavity. This knowledge is gained by placing the patient upon her back, and passing one or two fingers into the vagina toward the lower and anterior part of the body of the uterus, above the cervix; while, at the same time, pressure with the fingers of the left hand is made externally over the fundus of the uterus. If, under these circumstances, a sudden impulse be given by the fingers in the vagina against the uterus, and the fingers be retained in position, in a short time the practitioner will recognize a body striking against the inferior portion of the uterus. This indicates clearly, 1st, that there is a fluid in utero; and, 2d, something floating in that fluid: of course, that the woman is pregnant, inasmuch as we know of no other case in which this precise phenomenon can be developed. Care must be taken, however, to distinguish between any locomotion of the uterus and that of the body within its cavity. Gestation may thus be positively diagnosticated in some instances, although it cannot thus be determined whether the child be dead or alive.

Sixth. *Motions of the Fœtus*.—Very universally these constitute the first satisfactory proof that a woman is pregnant with a living child.

The first sensations vary as to the time of their occurrence; they are most frequently perceived about the sixteenth or seventeenth week of gestation: but some women are said to recognize them even at the eleventh or twelfth week, while others in successive pregnancies perceive no motion before the eighteenth, or even twentieth week. In a few instances women declare that they are not conscious of any such sensations until the seventh, eighth, or ninth month. The author was consulted by a lady, who became very anx-

ious about her situation; the uterine tumor was well developed to the seventh month without any motion being felt. She was much relieved by the assurance that her pregnancy was natural, and her child living. In another case the author was consulted at the end of the sixth month of utero-gestation, where both the patient and the practitioner had decided that the uterus was in a diseased condition, and that no fecundation had occurred. The author felt satisfied, however, that she was pregnant with a living child. A month afterward, the patient being in a distant portion of the country, and increasing very rapidly in size, another practitioner insisted upon it that she was dropsical and not pregnant, and treated her accordingly with drastic cathartics and active diuretics, to the great detriment of her general health. From this she recovered, and, after the end of the eighth month, another examination was made by the author, who reaffirmed that there was no disease, but that her pregnancy was normal. She was delivered of a healthy female child a month afterward, and did well; affirming, however, that during the whole of her pregnancy she never recognized the motions of her infant.

The first sensations about the fourth month are very trifling; they are felt for an instant, disappear, often are forgotten, and then return again, to the surprise of the mother, at irregular intervals. The sensation is sometimes described as like that of wind in the bowels, but more frequently, as being peculiar, sudden, vibratory, creeping, pulsatory, fluttering. The intervals become shorter, the sensations more decided, so that the patient has no doubt of the motions of a living being in utero. As pregnancy advances, these become stronger, more active, and sometimes very constant. They often affect the form of the uterus, so that irregular projections, apparently caused by the knees or elbows of the child, may be recognized even visibly.

The motion, when active and frequent, is generally supposed to be indicative of a strong, vigorous child. Probably this is true, but children are often very healthy and vigorous, where the motions are unfrequent and comparatively moderate. Occasionally, without any detriment to the child, the motion is suspended for several days, and sometimes, as in cases just detailed, no motion is often perceptible for months, or even the whole period of gestation. Nevertheless, the entire suspension of these active movements after they have once occurred, in conjunction with other signs, may indicate the death of the fœtus.

The movements of the fœtus in utero can also be recognized by the accoucheur, by an internal or external examination. We have already indicated that a passive motion of the child can be produced by pressing upon

the uterus with one or two fingers in the vagina. After the fourth or fifth month, passive motion can occasionally be recognized through the parietes of the abdomen by placing a hand on either side of the uterus and alternately pressing the uterus on the one side or the other. In some instances the fœtus will thus be felt falling from one part of the uterus to the other, especially if it be dead. This passive motion of the child, when dead, the patient herself sometimes recognizes, especially on sudden changes of position, when the fœtus is felt as falling from one side to the other.

By the process of "palpation," however, the practitioner can often feel, through the thin walls of the uterus and abdomen, the body, head, or even the limbs of the child, and thus satisfy himself of the reality of pregnancy. His confidence is greatly increased, in most of these cases, by distinctly recognizing the child in motion. The finger per vaginam often perceives the movements of the head through the lower part of the uterus; or the motions of the body are perceptible by laying a hand upon the abdomen. This is more likely to occur if a little gentle pressure be made upon the uterus, first upon one side and then upon the other; or if the hand be previously rendered cold before being applied to the abdomen. The movements of the fœtus thus excited are usually clear and decisive; but it is very erroneous to attribute this excitation directly to the consciousness of the fœtus, for it cannot perceive the hand of the practitioner, whether it be cold or hot when applied to the abdomen of the mother, inasmuch as there are no nerves passing from the parent to the child, and no nerves whatever in the placenta or cord. The impression is indirect. The tissues of the mother, especially of the uterus, are disturbed by the cold applied to her surface, or by the palpation by the hands of the practitioner. Contractions, therefore, of the abdominal muscles, uterus, etc., are thus produced, and through the medium of the liquor amnii conveyed to the infant, affecting its excito-motory system.

When the practitioner can be satisfied, either from his own examination or the consciousness of the woman, of the motions of the child, he may safely pronounce her pregnant. They constitute the first positive sign of the existence of a living child in utero. Nevertheless, in all cases of doubt and difficulty, especially where the character of the woman is unfortunately involved, the greatest caution is demanded, and the advice may be safely given, never to trust to the sensations of the woman. It is a matter of wonder how often females are deceived upon this very question of fœtal movement. We have already mentioned cases where patients have not been conscious of any such sensations during healthy gestation; and of course the general

practitioner may expect to meet with individuals who will deny even to the time of delivery that they ever perceived any motion within the cavity of the abdomen, for the purpose of deceiving the physician and all interested parties.

On the contrary, it is not uncommon to meet with women, anxious, it may be, for progeny, who imagine themselves pregnant because their menses are deficient or interrupted, their mammæ are tender, or they have unexpectedly become more corpulent. Such individuals often with the greatest sincerity describe all the varieties of fœtal movement, even to the full period of their supposed gestation. Such mistakes are made, not only by women who have never been pregnant, but by those also who have borne many children. We find also that females who are delicate, emaciated, with little or no swelling of the abdomen, have insisted on the reality of such sensations, and at the ninth or even the tenth month after their supposed fecundation, they have made all the preparations requisite for themselves and infants after delivery.

The source of such deception is very unaccountable, as in most cases the practitioner can readily decide the question. Peculiar sensations thus mistaken for the movements of a fœtus have been referred to flatus in the intestines, pulsations of the abdominal aorta, to impulses of the heart felt in the epigastric region, or to those dependent upon an aneurismal tumor. In other instances they have been referred to irregular actions of the abdominal muscles; and it is said that some women, for the purposes of deception, have acquired the power of simulating the motions of the child by throwing the abdominal walls into irregular action. All these facts indicate the necessity of great prudence on the part of the practitioner. He must trust to his own senses, and not to those of his patient. He will find also that in cases of obesity, of effusions into the peritoneum, of tumors, etc., that the diagnosis will become still more difficult, if not impossible, so far at least as a mere digital and manual examination can be made.

The *situation*, where the movements of the fœtus are felt, of course varies to a certain degree according to the stage of gestation, presentation, and position of the fœtus in utero. Few females recognize the sensation until after the fourth month; then, of course, they perceive it in the hypogastric region, and generally more upon one side than the other. As the uterus rises in the abdomen, the motions will be perceived toward the umbilical, and eventually in the epigastric and hypochondriac regions; of course, the location of these motions will vary to a certain extent, whenever the child alters its position in the cavity of the uterus. Hence, some females, at the latter period of gestation,

always feel the child toward the right or left side at the fundus of the uterus, more frequently toward the right. Occasionally, however, there is less motion toward the fundus, and more toward the cervix uteri. Hence, some practitioners have suggested that the presentation and position of the fœtus might be determined by carefully noticing these circumstances; but practically no positive diagnosis can be made of the presentation of the child by studying its movements. These are too indefinite and extend over a too large sphere.

The popular name given to the first sensations excited in the mother by a living fœtus is "Quickening." To this there can be no positive objection; but even at the present day it is the duty of every accoucheur earnestly to protest against the ancient theological and legal opinion that, prior to the fourth month, the embryo had no proper existence; that it was not a human being, but a mere inorganic, amorphous mass, and, of course, not entitled to protection from the law of God or man; that about the sixteenth week it was *quickened into life*, became the recipient of a soul, and, thenceforth, but not before, was to be regarded as endowed with animal and spiritual life, which could not be impaired or destroyed without violating the divine injunction, "Thou shalt not kill." From statements already made, the merest tyro in physiological investigations must be convinced of the falsity of all such opinions. From the moment of fecundation, the new being becomes independent of its parents; from that time it has no direct vital connection even with its mother; its individuality is complete. It possesses everything essential to its vegetable, animal, and spiritual nature; in due time all its organs are developed, and after birth there is a progressive manifestation of its animal and spiritual power gradually advancing from one degree of perfection to another. Every protection, therefore, which is extended by human legislation to the young infant or even to the adult, should be equally effectual in securing the life of the embryo from the earliest period of its existence.

The word "quickening" has been applied, however, not simply to the motions of the fœtus, but also to the sensations occasionally excited in some women on the sudden ascent of the pregnant uterus out of the cavity of the pelvis into the abdomen. This ascent is very generally so gradual as to be insensible to the patient; but in a few instances, it may be from the distension of the bladder, the pressure of the intestines, etc., or perhaps more frequently from the resistance given by the promontory of the sacrum, the natural tendency of the uterus to rise up is resisted, and therefore delayed. Afterward, in consequence of some exertion on the

part of the patient, some distension of the rectum, or other cause, the resistance is overcome, and the uterus suddenly slips through the superior strait, its long transverse diameter passing above the level of the diameters of the plane of the strait. Such a sudden ascent is accompanied by peculiar sensations, sometimes by pain, and occasionally by the escape of some blood from the vagina; and it is often followed by faintness or complete syncope, by feelings of exhaustion, or other hysterical symptoms. These phenomena are very evanescent, and patients seldom suffer any inconvenience from this source, and need not apprehend any return of these unexpected, distressing feelings.

Seventh. *Auscultation*.—Examination by auscultation, which has been employed with immense advantage in investigating diseases of the chest, has contributed greatly to the diagnosis of pregnancy, especially in the important question, whether the child be alive or dead in the mother's organs. It appears to have been originally suggested by M. Mayor, of Geneva, in 1818; but the suggestion received little attention until the publication by M. De Kergaradec, in 1823, who demonstrated its great practical importance. Much attention has been paid to this subject since the above period, and the value of the discovery has been confirmed.

Auscultation may be immediate or mediate, direct or indirect. The ear may be directly applied to the parietes of the abdomen, or indirectly through the medium of the stethoscope. Perhaps most practitioners in this country prefer the direct application of the ear to the uterine region; but this is not always convenient, or so agreeable to the feelings of the patient. The stethoscope has the advantage, that it can be applied to every part of the abdomen with facility, and the locality of the sound can by it be more readily ascertained. The intensity also of the sound is said to be increased. M. Nauche has modified the stethoscope by connecting it with a bent or flexible tube, so that the trumpet extremity may be introduced into the vagina, and applied to the lower part of the uterus. He has termed such an instrument a "*metroscope*;" but, as M. Cazeaux observes, no practical advantage has resulted, and it is very objectionable, not merely on the score of delicacy, but as liable to excite vaginal and uterine irritation.

In applying the ear to the parietes of the abdomen, after the fourth or fifth month of pregnancy, two distinct sounds can often be recognized as emitted from the uterus; the one, a pulsatory sound, the other, a cooing or murmuring sound. The first has been referred to the pulsations of the fœtal heart, the second has been indirectly or directly connected with the utero-placental circulation.

First. *Pulsations of the Fœtal Heart* can very

universally be heard, especially about the middle period of gestation; the double beat of the auricles and ventricles, the rhythm, the strength, the frequency can readily be detected by the experienced ear. The pulsations vary from one hundred and thirty to one hundred and fifty per minute, and they are, therefore, nearly double those of the mother, whose pulse, at the same time, is seventy to eighty; they are, therefore, entirely independent of the mother's circulation, and certainly indicate, not merely the existence of pregnancy, but also the vitality of the fœtus. The strength of the sounds are, *cæteris paribus*, proportionate to the stage of pregnancy and to the strength of the fœtus. Hence, they are more perceptible toward the full period of utero-gestation, and cannot be perceived before the sixteenth, or even twentieth week, although some authors, as Kergaradec, Kennedy, and others, insist that these sounds can be detected even at the twelfth or fourteenth week. Hence, also, if these sounds have been distinctly heard during pregnancy and labor, and if they gradually become more feeble, apprehensions must be excited as to the safety of the infant; and if, under these circumstances, they cease altogether, there can be little doubt of the death of the child.

The distinctness of the sound depends much on the position of the child. Hence, it is best heard when the dorsum of the child is anterior, either in cephalic or pelvic presentations. If, however, the dorsum be posterior, the sound is more indistinct, and Stoltz affirms that sometimes it cannot be heard, while M. Cazeaux reports that it is perceptible in all cases where the spine of the child is posterior.

The distinctness of the sound also depends upon the thickness of the parietes of the uterus and abdomen. Hence, it is generally very distinctly heard in delicate and emaciated women. It is more indistinct in corpulent females, also where there is a large quantity of liquor amnii, or when a portion of the omentum or intestine, the placenta, or some tumor of the uterus intervene between the ear of the practitioner and the heart of the child; and, of course, when there are dropsical effusions in the cavity of the abdomen. In these and in analogous cases the child may be alive, the pulsations of the heart vigorous, and yet the sound be very indistinct, and, we believe, in some cases, inaudible even to the most experienced and delicate ear. Practitioners, therefore, should be very careful in deciding too hastily that the child is dead because the pulsations of the heart cannot be heard. It may be remarked, further, that the pulsatory sound is more perceptible after the liquor amnii has been discharged, or when, from any circumstance, there is any diminution of the space be-

tween the body of the child and the cutaneous surface of the parent; as, for example, the sudden disappearance of dropsical effusions into the peritoneum, or the discharge of gas or feculent matters from the intestines. Nevertheless, if the labor be tedious, and the uterine contractions powerful, the pulsations of the heart become weaker, and may even be arrested.

The situation of this sound must depend on the location of the heart, and, of course, of the thorax of the child; hence, it may vary, even in the same pregnancy. As the presentation is generally cephalic, with the occiput toward the left ramus of the pubis, the sound is most frequently heard over the left groin, about midway toward the umbilicus; if, however, the presentation be pelvic, it will be heard toward the upper part of the uterus. Hence, by auscultation at different periods of pregnancy, the change of presentation may thus be detected, and, in many instances, the practitioner can speak positively as to the general question, whether the head or the pelvis be most dependent in utero. Many authors have investigated these points very minutely, and feel great confidence that they can state, *à priori*, the presentation and position of the fœtus prior to labor. Making every allowance, however, for any peculiar skill they may have acquired, we do not think that much precision can be accorded to these investigations, especially as regards transverse positions of the fœtus, where the thorax, as in cephalic presentations, is near the brim of the pelvis.

Some dependence, however, can be placed upon auscultation in determining the existence of compound pregnancy. This is the more valuable, as we have no other means of ascertaining the presence of two children in the cavity of the uterus.

If, therefore, a pulsatory sound be heard with equal distinctness in different portions of the uterus, we have a right to affirm the existence of two children in the cavity of the organ, even if there be some difference in the strength or frequency of the pulsations.

It may happen, however, that compound pregnancy may exist, and yet not be detected, because, as Cazeaux observes, one child may be directly anterior and the other posterior; or, it may be added, because the pulsation of one heart cannot be detected in consequence of the large quantity of water present in the two ova, or of one child having its back presenting to the posterior region of the mother. It may happen also that the pulsation of one heart may be exceedingly feeble, or has ceased altogether, while that of the other is vigorous.

Another source of deception may arise from the great resonance of the heart, so that it may be distinctly heard over a large surface. It will be found, however,

that if there be but one child, the sound will be much stronger in one spot, from which it will gradually diminish. On the contrary, if there be two hearts, and the stethoscope be carried, says Cazeaux, in a direct line from one toward the other, the sound will gradually diminish to an intermediate point, and then be gradually augmented as the other heart is approximated.

The value, therefore, of auscultation as regards the pulsations of the heart is exceedingly great; but we would guard the young practitioner particularly from two errors: *first*, not to be too hasty in determining that there is no pregnancy, because he cannot detect the sound of the heart; and, *second*, not to act rashly on the supposition that the child is positively dead because no pulsation can be perceived; as the infant may be feeble or asphyxiated, or some of the circumstances indicated may be present, which may render the sound of the heart inaudible.

The Second Sound perceived by auscultation is far more uncertain. From its character, it has been termed a murmuring, cooing, hissing, bellows-like sound, "bruit de soufflet," etc., etc. It is intermittent, not in accordance with pulsations of the child's vessels, but with those of the mother. Hence, it is evidently dependent not on the placenta, but upon the blood-vessels of the uterus or adjacent tissues. Much difference of opinion, however, exists as to its location. Many, as Bouillard and Velpeau, contend that it is owing to the pressure of the enlarged uterus upon the aorta and other large arteries of the abdomen. Many cases are detailed, where a bellows-sound has been heard, from pressure upon these vessels by tumors, etc., where no pregnancy existed. It may be affirmed, however, that all such sounds are irregular, and very generally not to be detected, even if the uterine and other tumors be very large. The general impression at the present day is, that the sound is located in the uterine structure, which, according to Dubois, during pregnancy is analogous to an erectile tissue, and that the sound, therefore, depends upon the rapid passage of blood from the arterial into the greatly distended venous tubes. Hence, when the circulation is excited, or the mother in a very nervous condition, the murmuring sound can be detected over the whole body of the uterus; but it is generally confined to that portion of the ovum where the placenta is located, and where the circulation is the most active. This opinion, we think, is supported by the facts with which we are familiar on this subject, and, if true, the sound may be well denominated the "utero-placental murmur;" as being caused by great vascular excitement in that portion of the uterus opposite to the placenta.

Various irregularities, however, exist, as in many

pregnancies the sound is not to be detected. In others, it appears and then disappears. In some, it is purely uterine; in others, it seems to be increased by the action of the surrounding tissues. M. Cazeaux has suggested that this uterine murmur is often connected with hydræmia or serous plethora of the blood-vessels, and considers it analogous to the bellows-sound of the heart and arteries evinced in chlorotic patients.

The period of pregnancy in which it can be detected, of course, must vary much; often it is not to be heard in the latter period of gestation, while many assert it can be heard at the fourteenth or sixteenth week. As a general observation, it can seldom be detected before the sixth month.

As an auxiliary sign of pregnancy, we must esteem it of considerable importance, as it is very seldom distinctly heard, unless there be a placenta, and that placenta vitally adherent to the internal surface of the uterus, or, it may be, to the adjacent tissues. In a remarkable case of peritoneal pregnancy observed by the author, where the child was developed for six months, a strong, well marked, murmuring sound was perceived in the left iliac region, where subsequently the placenta was found to be of large size and adherent to the peritoneum. Hence, if the placenta be alive, and located toward the anterior part of the uterus, and if the uterine circulation be active, the utero-placental murmur may be generally detected; and hence we have an explanation of the facts recorded by Chailly, of the murmur being heard after the delivery of the child, also in cases of moles, or false conceptions, of hydatids, etc., even where the fœtus had perished, its appendages being still living, although in a morbid condition.

The irregularities noticed by practitioners may be partially accounted for by the placenta being located toward the posterior part of the uterus, where its sound could not well be detected, and especially by the ever varying condition of the nervous and vascular excitements of the mother, and other analogous causes.

The use of auscultation in the practice of obstetrics is therefore exceedingly important, not merely to enable us to diagnosticate the existence of pregnancy and the life of the fœtus, but also to aid our decision in cases of difficult labor. By it we ascertain to a certain degree the vigor of the child, whether its powers are failing, or whether it be actually dead, and thus decide as to the propriety of important operations, such as the forceps, embryotomy, etc., and also the proper time for their execution. Operations, for example, may frequently be resorted to for the benefit of the mother, if the child be dead, which might be unjustifiable if the fœtus be still living.

Funic Souffle.—Dr. E. Kennedy, M. Nægèlè, Jr.,

and others, believe that they can recognize pulsations in the cord of the child, especially when it is subjected to pressure, by being entwined around the neck or body. The sound is synchronous with that of the foetal heart, and therefore not maternal. It is often indistinct, so as to be a delicate murmur or souffle rather than a pulsation. We believe that few individuals exist, skilful enough to detect this funic souffle, or to educe from its existence any rule of practical importance.

Eighth. Violet color of the vagina and vulva.—This occasionally exists, and has been regarded by Jacquemier as a test of pregnancy. Doubtless it and pregnancy are often coexistent, but this violet color ought not to be regarded as a positive sign of gestation. It evidently arises from the pressure of the uterus upon the large veins of the pelvis, preventing the free return of blood, and thus giving rise to venous congestions of the pelvic tissues. Hence result, not only a blue tinge of the vagina and vulva, but also a turgescence of the hemorrhoidal vessels, the formation of hemorrhoids, and sometimes discharges of blood from the rectum, and, it may be, from the vagina. Cazeaux also speaks of violet-colored spots, or maculæ, small elevations or granules on the vaginal surface, enlargements of the follicular glands, etc.

This congestion of the mucous membrane of the vagina is ordinarily relieved by free mucous or seroid discharges; and hence a "violet color" is seldom observed, or, at least, it is very trifling.

Tenth. Kyesteine.—It has been long known that in pregnant women certain changes occur in the urinary secretion. M. Nauche, in 1831, first described a peculiar deposit of a caseous character, which he termed Kyesteine. These observations were confirmed by many experiments in Europe, and also in America, especially by Dr. Elisha K. Kane, of this city, in the spring of 1841.

If the urine of a pregnant woman be allowed to stand in a wine-glass exposed to the atmosphere, in a few hours there will be a deposit of "cloudy flakes" on the sides and bottom of the glass, the urine becoming more limpid. This deposit is not characteristic. At the end of the second or third day, the urine again becomes clouded with increased intensity, and soon, more or less perfect, a pellicle forms upon the surface. About the third or fourth day, portions of the pellicle begin to separate and are precipitated, so that by the fifth or sixth day the greater part of the pellicle has disappeared. This pellicle is kyesteine. Occasionally new pellicles are formed, which successively vanish.

It is seldom seen prior to the second month of uterogestation. Dr. Kane has observed it at the end of the

fourth week. It is generally most intense, however, between the third and seventh month of gestation, and not often seen during the latter months.

It is seldom found, except in the urine of pregnant females; but Dr. Kane has also noticed it in lactescent women. In forty-four out of ninety-four cases of suckling women, he observed kyesteine, presenting all its characteristics. Some authors have asserted that it may be observed in certain pathological conditions, such as phthisis, articular diseases, etc., etc.; but as the pellicle in such cases is not usually observed before the fifth or sixth day, it seems to be connected with the process of putrefaction, which is not the case in the formation of kyesteine. There is reason to believe, therefore, that this substance is peculiar, being gelatino-albuminous, as termed by Eguisier, differing from pure gelatin or albumen, and to be found only in the parturient condition, in the proportion, according to the observations of Dr. Kane, of four out of five in pregnant women, and nearly of one-half in lactescent females.

Dr. Kane, therefore, concludes that its formation is intimately connected with those changes in the fluids which precede and attend the process of lactation.

If the observations be carefully made, the existence of kyesteine in the urine may be regarded as one of the positive signs of pregnancy, not to be exclusively relied upon, but as assisting us in forming our diagnosis.

Subsequent writers do not differ materially from this description of kyesteine. We must, however, observe that Prof. Lehmann asserts that this pellicle is not peculiar, but merely the result of decomposition, and may be noticed under other conditions than that of pregnancy.

RATIONAL SIGNS OF PREGNANCY.

Besides the sensible or positive signs of pregnancy, there are many others which are not unfrequent, but cannot be regarded as peculiar to this state, inasmuch as they may be found in many pathological conditions not complicated with pregnancy.

If, however, these signs should be noticed in healthy married women, where there is no evident disease, they would render it very probable that pregnancy had occurred. They excite the suspicion of pregnancy, and greatly confirm any sensible sign which may be present. They are hence termed not positive or sensible, but rational or probable signs of pregnancy.

They are often very trifling, scarcely disturbing the health or even the comfort of the individual during the whole period of gestation; while, in other instances, they are more or less distressing, severe, or even dan-

gerous. In such cases they may be regarded as morbid, really constituting the peculiar diseases of pregnancy. It is impossible, therefore, to draw a line of demarcation between what are termed the rational signs of pregnancy and its diseases; between what is normal and what is abnormal. To a certain extent the nervous and vascular systems may be excited or disturbed with perfect impunity: but if such disturbance or excitement be augmented, the physiological passes insensibly into the pathological condition. This may sometimes become so intense as to endanger or destroy the life of the patient, and yet may be regarded strictly as nothing more than excessive physiological excitements, no peculiar morbid element being superadded. For example, the simple nervousness of pregnancy may be inordinately augmented, so as to be manifested in the form of violent convulsions. Also the natural excitement and fulness of the blood-vessels may be aggravated, until dangerous phenomena result from the violence of the excitement, from general plethora, or local congestions. Yet no one can determine the line of demarcation between the healthy and the morbid state. Hence, we shall trace the rational signs of pregnancy from those which are moderate or physiological to those which are more severe or pathological; and shall thus include under the present head what have been technically called by authors the Diseases of Pregnancy, after which the therapeutical indications and appropriate treatment will be detailed.

The *rational* signs may be advantageously considered, for the purposes of description, under two general heads:—

First. Those dependent directly or indirectly upon the *enlargement* and *pressure* of the uterus; and,

Second. Those dependent on *sympathy*; in which other tissues or organs suffer from the excited state of the uterine functions.

The disturbances of pregnancy dependent on pressure, will be considered in reference to,

First. *Bladder and Urethra*.—Among the earliest symptoms of gestation is often an increased desire to urinate, where there is no actual increase in the quantity of the urinary secretion. At the third or fourth month there is a difficulty in urinating, from pressure of the uterus against the urethra and pubis, causing partial, and sometimes complete obstruction. If relief is not afforded, this retention of urine may cause retroversion of the uterus, and all those terrible symptoms which necessarily result in similar cases of distended bladder. Death has not unfrequently been a consequence. In the advanced stages, there is, generally, less pressure upon the urethra, while the bladder, now above the pubis, is compressed between the uterus and

the abdominal parietes, giving rise to a frequent inclination to urinate, and often to incontinence of urine. Involuntary discharges ensue from standing, walking, coughing, straining, etc. Occasionally retention may occur, but this is comparatively rare, unless labor be present, and the urethra become impervious from the strong pressure of the head of the child against the pubis.

Second. *Vagina*.—This canal is sometimes prolapsed; this is frequently followed by congestion of the venous vessels, by leucorrhœa, and even hemorrhage, as already noticed under the positive signs of pregnancy.

Third. *Rectum*.—Pressure upon this intestine excites fulness, weight, indisposition to stand or walk, inclination to stool, tenesmus, and occasionally a disposition to prolapsus ani. More frequently it causes congestions of the blood-vessels, whence serous and mucous excretions, the formation of hemorrhoids, with their usual severe consequences, hemorrhage, inflammation, etc.

In the latter months of gestation, there is little direct pressure upon the lower part of the rectum, but often more upon its upper portion, and the sigmoid flexure of the colon. This may cause some difficulty in the descent of feculent matters, and also a collection of feces in the rectum, sometimes to a large amount, arising, not merely, therefore, from the torpor of the intestinal canal, but mainly because the uterus occupies so fully the brim of the pelvis, that the straining or bearing-down efforts of the abdominal muscles have little or no influence in assisting the process of defecation. This feculent accumulation in the rectum becomes itself a cause of tenesmus, and it may be of uterine irritation, miscarriage, etc.

Fourth. *Walls of Abdomen*.—After the sixteenth week, the parietes of the abdomen become gradually more and more distended, not unfrequently with impunity, but often muscular or neuralgic pains are excited at the origin and insertion of the various abdominal muscles; hence, soreness and pain at the pubis or sternum; hence, also, pain in the right or left hypochondriacs, and toward the right or left iliac region, or in the lumbar regions. Pain is often experienced about the umbilicus, the orifice of which is distended. Distension of the skin also often excites much soreness and pain.

Reducible inguinal, or crural hernia, disappears as the intestines are elevated; while, not only umbilical, but also ventral hernia may be excited. Where there is great relaxation of the vagina, there may be a prolapsus, not only of the vagina, but also of the bladder, (cystocele,) at the vulva.

These effects of distension will, of course, be aggra-

vated, if there be an unusual quantity of liquor amnii, if there be a compound pregnancy, or if gestation be complicated with enlarged viscera, tumors, dropsies, tympanites, feculent accumulations, or any additional source of enlargement. From this pressure the patient may be disabled so that she cannot walk nor stand with comfort.

The symptoms may be augmented not only by this internal, but also by external pressure. The abdominal muscles are often irritated, and thrown into spasmodic contractions. Women are often imprudent, making too much muscular exertion, in walking, dancing, running, while wearing tight dresses, corsets, bands around the body, braces, etc. Thus, uterine irritations, pain, contractions of the uterine fibres, abortions, premature labors, etc., may be excited.

As the uterus rises it is compressed between the muscular walls of the abdomen and the convexity of the lumbar vertebræ, especially in first pregnancies. Hence, the organ is usually turned from this convexity to one side or the other of the abdomen, producing a right or left lateral obliquity. In multiparous patients such obliquities are comparatively rare, owing to the want of tension of the abdominal walls.

Fifth. *Arteries and Veins*.—Pressure upon the venous vessels, in the latter stages of pregnancy, especially upon the inferior cava, and the common iliac veins, etc., evidently retards the return of blood to the heart. Hence, as we have already noticed, result congestion of the pelvic veins, and its consequences, especially of the vagina and rectum. Venous congestion, also, ensues in the lower extremities, causing not simply distension of the superficial veins, but effusions, generally of serum, into the areolar tissue. Hence, *anasarca* of the feet, and, indeed, of the whole lower extremities, takes place to an enormous degree. This may be, although rarely, followed by inflammation, abscesses, and even sphacelus, especially when complicated with a general dropsical diathesis; sometimes bloody effusions ensue into the areolar tissue, as in ecchymosis; not unfrequently the veins are not only distended, but become permanently varicose, and sometimes followed by ulcerations, hemorrhages, etc.

Pressure upon the absorbent vessels probably increases the disposition to anasarcaous effusions.

Sixth. *Nerves*.—Pressure on the trunks of the nerves often excites much uneasiness, and sometimes severe suffering. In the early stages of pregnancy, while the uterus is still in the pelvis, pressure is often made upon the obturator nerves, also upon the sacro-sciatic plexus; subsequently, the crural and lumbar nerves often suffer. Hence, arise sensations of weakness and exhaustion; the patient often complains of stiffness, numbness, pain,

even of severe spasms, cramps in the lower extremities, hips, sides, etc.; not unfrequently reflex influences, to the spinal marrow, and brain, cause spinal and cerebral irritations, with general spasms and convulsions.

Seventh. *Abdominal organs*.—When there is great distension of the abdomen during pregnancy, much disturbance of the functions of almost all the organs may ensue. The bowels are usually torpid, tympanitic, and often the food can hardly be retained in the stomach. The functions of the kidneys are also disturbed by the pressure made on the renal veins. Hence, congestions of the kidneys, increased secretion of urine, and even, it is said, an altered condition of this fluid, which is sometimes found to contain albumen, even in considerable quantities. It is thought, that not only congestions, but also inflammations of the tubes, and cortical portions of the kidneys, constituting "Bright's disease," may be the result. The heart and lungs suffer much from the upward pressure of the diaphragm. This imperfect action of the heart and lungs, combined with the pressure made upon the arterial and venous trunks of the body, disturb the cerebral functions, by causing congestions, irritations, etc.

Secondly. SYMPATHETIC SIGNS.—It is not always easy, in practice, to distinguish those symptoms which arise merely from pressure from those caused by irritation, especially as they are generally co-existent, aggravating each other. It will be useful, however, to make the analysis, as far as possible, so as to form proper indications for treatment.

The irritability of the *bladder* often depends upon the excited condition of the uterus, of the nervous system, and also of the condition of the urine, caused by pregnancy, independently of the effects of pressure.

In addition to the phenomena already noticed, females often suffer sensations of heat, burning, itching, etc., not confined to the *vagina*, but extending to the whole vulva, which phenomena are usually known under the expression of "*pruritus vulvæ*." Sometimes there are acrid, seroid, or mucoid discharges; in other cases, the tissues are unusually dry. The mucous follicles of the vagina are occasionally tumid, elevated, like granules, and often inflamed. The membrane of the vulva is generally smooth, glossy, and sometimes ulcerated. These symptoms are often transient, lasting only a few days, and are comparatively not very frequent. They are sometimes, however, so severe as to disturb the general nervous, and even vascular system; hence, the patient becomes restless, irritable, hysterical, and often feverish.

The *rectum* also suffers; hence, pain from defecation,

also tenesmus with irritating serous and mucous discharges, and occasionally with decided symptoms of rectitis.

Intestines.—Generally, in pregnancy, their action is torpid. Hence, tympanites, constipation, etc.; but occasionally the bowels become irritable, without any apparent cause, excepting gestation. Some females are very subject to diarrhœa, or even to dysentery, while carrying their children. This is sometimes connected with indigestion; in others, however, the intestines may be said to be irritable, so that frequent watery or bilious evacuations are induced by very slight causes, such as moderate changes of temperature, mental excitement, agitation, etc. Such attacks are often transitory, seldom debilitate the patient, but, of course, are very apt to return.

Stomach.—This organ has sometimes been called the "centre of sympathies," as the functions of this organ are readily disturbed, and then exercise very distressing influences over the whole economy. This remark is especially true, as regards its connection with the uterus. Those who are familiar with uterine complaints in the unimpregnated condition recognize this truth. The author has met with many cases, even in young girls, where anorexia, nausea, vomiting, etc., were precisely analogous to what occurs in pregnancy; these ensue from irritable conditions of the uterus, resisting all the ordinary methods of treatment for dyspepsia, but disappearing as soon as the irritation of the uterus ceases.

In pregnancy, these gastric symptoms are, therefore, very common, and sometimes among the primary symptoms; and hence they are regarded by many women as one of the most positive indications of their change of condition. They vary, however, in different individuals; indeed, many pass through the whole period of gestation without the least disturbance of the stomach; on the contrary, their appetite and digestion are often improved. Many authors have regarded this as an unnatural condition, and even as portending mischief to the child or parent. Such children, they say, often perish, or are born weak and feeble. We, however, can perceive no reason, theoretical or practical, for this opinion. In no instance have we been able to trace any connection whatever as existing between a good condition of the digestive apparatus with any infirmities of the child or its parent; on the contrary, women are generally better under such circumstances, and carry healthy and vigorous children to the full period of utero-gestation. Indeed, this would seem to be natural, inasmuch as strong, laborious women, who live out-of-doors, more frequently escape nausea, and very universally suffer far less than those who are

sedentary, or surrounded with the luxuries of life. Moreover, no explanation can be given why the fœtus in utero should be feeble, while the mother's digestion is good; or that the child in utero should thrive, because the mother has no appetite, and is suffering from nausea, vomiting, etc.

These functional disturbances, when present, vary exceedingly in different temperaments and constitutions, and even in the same woman in different pregnancies. In many, there is simply anorexia, or want of disposition to take food at regular intervals; in others, there is nausea, a short time every day, sometimes recurring frequently, generally in the mornings, and disappearing by mid-day, so that the patient feels well for the remainder of the day. This is so frequently the case, that the expression of "morning sickness" has been given to this condition of the stomach in pregnancy. This nausea, in some, will continue all day; while others feel well in the morning, and the nausea comes on toward evening, and even at night-time. This symptom is often very distressing without vomiting, when accompanied with great straining, and no discharge from the stomach but wind. In others, watery or glairy fluids are thrown up; while, in many, the contents of the stomach are evacuated almost without any change in their character. In other instances, it is very acid, and sometimes offensive.

These sensations of nausea are often accompanied with great feelings of weakness or sinking at the epigastrium; great sensations of emptiness, as if something had been removed. Others complain of a sensation of fulness, weight, pressure, as if something ought to be ejected.

These symptoms are aggravated under numerous circumstances, by motion, for example. The patient may feel well in bed, but upon rising or moving about, immediately suffers from nausea, and often from vomiting. It is usually aggravated by allowing the stomach to be empty; hence, even immediately after vomiting, relief is afforded by taking food, or by stimulating drinks. Nausea is often excited through the medium of the senses; disagreeable smells, sights, or something that offends the sense of smell, hearing, or even feeling, disturbs the stomach.

The distress is also augmented by the state of the mind, feelings, and imagination of the woman; the very thought of food excites nausea, disgust, and even retching or vomiting.

The opposite is also true. Pleasant ideas, the expectation of some unusual article of diet, agreeable company, conversation, indeed, any sudden change of mental occupation, will afford instantaneous relief. We have often known patients suffering excessively from

nausea and mental depression speedily relieved by being forced to leave home, change their diet and associations. Cazeaux mentions the case of a young lady, exceedingly depressed from gastric disturbance, relieved by a sudden diversion of thought and sentiment by the illness of her husband.

Analogous states of the nervous system are manifested by what have been termed the "fastidious tastes" or longings of pregnant women, "*Pica*," "*Malacia*," which are also observed in chlorotic girls. There is a disposition to eat charcoal, lime, slate, magnesia, or they fix their desires on some article of food difficult or impossible to procure.

Such are the common or ordinary evidences of gastric disturbance; in other instances, the symptoms are far more severe, and occasionally without remission, such as are observed in severe forms of dyspepsia, or gastric irritation. Hence, we have cardialgia, pyrosis, gastrodynia; and, secondarily, sensations of heat, burning, and other symptoms of gastritis. These are often severe, and occasionally, it is supposed, dangerous. Indeed, many authors have recorded cases where a fatal issue has resulted from the sickness excited by pregnancy. We, however, have never met with such instances, and it is difficult to conceive that they will ever occur, excepting where gestation is complicated with acute or chronic diseases. Cazeaux, who considers such occurrences as very rare, mentions some in which the autopsy revealed peritonitis, and chronic ulcerations of the stomach; this would seem to be the case, even in many of those instances of a fatal issue detailed by Chomel and others. Certainly the gastric disturbances, indicative of pregnancy, however severe and long-continued, are very seldom productive of permanent mischief, and, very rarely, of death. This is the experience of most practitioners, including such men as Burns and Desormeaux.

This, as will be presently seen, involves points of vital practical importance, as regards the mother and the fœtus.

In a large majority of women, these gastric disturbances disappear before quickening; they very seldom commence until three or four weeks after conception, that is, soon after the period in which the menses should have occurred. Hence, the usual duration of this sickness of the stomach is about eight to twelve weeks. In a few instances, nausea commences very early, being the first indication of pregnancy. In some, however, this symptom does not appear till the third, fourth, or even to the seventh or eighth month of gestation. In others, there are remissions appearing at irregular intervals; while, in some, it is almost continuous from the beginning to the end of gestation,

some few suffering during the night as well as the day. It is a remarkable fact, that as soon as abortion or labor takes place, these gastric symptoms disappear; and, in many instances, they cease, even if the child should die in utero. Thus is shown the dependence of this state of the stomach upon what Mr. Burns terms "the action of gestation;" that is, the state of nervous and vascular excitement of the uterus, produced and kept up by the presence of a living being. Hence, the sudden disappearance of nausea and vomiting has often been regarded as a bad symptom, so far as the fœtus is involved. This, however, should never be relied upon, as innumerable circumstances may suspend the sickness suddenly, without any detriment to the infant.

It may be important to remark, that the gastric disturbances in the latter periods of pregnancy, which are rare, usually differ very materially from that at the commencement. In the former case, there may be very little nausea, or proper vomiting; it is rather a sense of fulness and oppression, and the discharge from the stomach is effected by a kind of eructation, rather than vomiting; the whole is evidently dependent, even in the opinion of the patient, upon pressure from the enlarged uterus. She will often affirm, that a sudden motion of the child will cause an ejection of food; the matter ejected, also, is generally in a good condition, free from acidities, offensive smell, etc.

Much speculation has existed as to the cause of nausea and vomiting in pregnancy. These are unsatisfactory, and we must be content here as elsewhere with the simple fact, which may be expressed with the word "sympathy,"—that is, the conjoint suffering of two or more organs.

Epidemic influences have been suspected as the cause, but certainly without any foundation, taking the word "epidemic" in its ordinary signification.

Inflammations and ulcerations of the cervix uteri have been suggested by Mr. Bennett as a cause of the nausea of pregnancy. This is certainly one of the ultraisms of the age, making ulceration of the neck of the uterus as frequent as the occurrence of nausea in pregnancy! It is well known that such ulcerations may exist without any disturbance of the stomach, and also the reverse is true. If, therefore, ulceration should co-exist with gestation, it cannot be regarded as an essential cause, but, at the utmost, merely as an aggravating cause. Cazeaux states, that his examinations with the speculum do not confirm the reports of Mr. Bennett. It may be further added that ulcerations of the neck, in pregnant or unimpregnated conditions, often disappear, and yet the gastric disturbance remains in full force.

Rigidity and pressure have been regarded as causes, and hence primiparous patients are more likely to suffer than multiparous. This assertion, however, is not confirmed; for certainly females who have borne many children suffer as much, if not more, in their late as in their first pregnancies. The supposition is contradicted also by the fact that the nausea is troublesome generally at the beginning of gestation, when there is little pressure or rigidity involved, and when the pressure becomes greater in the latter periods the stomach is relieved.

Albuminuria is another supposed cause, but apparently with as little foundation, as this state of the urine is comparatively uncommon, while nausea and vomiting are very frequent. It also occurs, if at all, after the third or fourth month of gestation, the period in which nausea usually disappears; and, moreover, albuminuria may exist to a great extent without nausea or vomiting.

The nature of this derangement of the stomach has been the subject of much discussion.

We have no hesitation in terming it a nervous affection—a dyspepsia, depending on an irritation or disturbance of the gastric nerves, intimately connected as they are with the whole ganglionic and cerebral systems. We use these expressions as contradistinguished to inflammatory or congestive states of the gastric tissues. If inflammation exists, it is accidental, secondary, not primary; and it is not directly connected with the fact of gestation. This opinion, we think, is sustained by the following facts, already alluded to:

First. That this nausea of pregnancy is relieved by stimulants, which would aggravate inflammatory affections of the stomach; pregnant women are benefited by solid food, by spices, brandy, etc.

Second. Narcotics are very valuable, as will be hereafter seen, often affording immediate relief, by acting, as they do, chiefly upon the nervous system.

Third. This nausea, and the consequent indigestion, appear and disappear with marvellous rapidity, according to the ever varying condition of the cerebro-spinal system: the patient is often relieved by lying down; very often by a long walk or drive in the open air; and also by a change of thought, or some strong mental excitement.

Fourth. It disappears immediately on the occurrence of labor at any period of pregnancy, and also on the death of the foetus in utero.

Fifth. It is aggravated by any unpleasant impression on the senses, mind, or feelings of the patient.

Sixth. It is increased by antiphlogistic remedies, or by whatever tends to debilitate the woman.

Seventh. The symptoms are analogous to those arising from uterine irritation in unimpregnated women, which appear or disappear, according as relief is afforded or withheld from the uterus.

Eighth. When nausea ceases, however suddenly, there is generally a good appetite and good digestion; there is no slow convalescence, as in recoveries from gastritis: the patient passes rapidly from a state of great distress, as regards her stomach, to one of great comfort: no chronic or permanent injury is sustained.

Ninth. Post-mortem examinations confirm these views; in no case has it been positively shown that ulcerations or organic changes in the organ could be directly traced to the sickness connected with pregnancy. The only exceptions to this fact may perhaps be found in some rare cases, such as quoted by Chomel, Dubois, etc., where, from a long continuance of gastric disturbance, the process of digestion had been so enfeebled, and the various secretions become so acrid and irritating, as to excite, in conjunction with the undigested aliment, secondary gastritis, the consequences of which will be found in post-mortem examinations.

Liver.—The state of this organ is closely connected with that of the stomach, and also with the cerebro-spinal system of nerves. Gestation, therefore, which disturbs the functions of the stomach, interferes with those of the liver; very generally the secretion and excretion of bile are diminished. This is, probably, one of the causes of constipation. It also produces the high-colored condition of the urine, the sallowness of the cutaneous tissue, the yellowish tinge of the conjunctiva of the eye, etc. These symptoms occasionally augment, so that the patient has all the appearance of icterus or jaundice: hence, old authors allude frequently to the jaundice of pregnant women.

To this state of the liver is usually attributed the discolorations of portions of the skin, such as brown spots or maculae, or large patches of a brown color observed upon the forehead, face, neck, breasts, etc., especially after the middle of pregnancy, and generally disappearing gradually after delivery.

In some instances this torpor of the liver either does not exist or is followed by an inordinate biliary excretion. Hence we have bilious diarrhoea, often connected with and aggravating the irritable state of the intestines, formerly mentioned. These excretions, generally irregular, appearing at longer or shorter intervals, may be useful, yet sometimes causing debility or even exhaustion.

Kidneys.—The functions of these organs are more or less disturbed in pregnancy. Such disturbances vary, however, exceedingly under the influence of diversified causes, chiefly depending either upon pressure

or the conditions of the nervous and vascular systems. Pressure, for example, after the fifth month of utero-gestation, made on the renal vessels in front of the spine, is thought to produce congestion of the kidneys; and such congestions are supposed to be followed, 1st, by an increased flow of urine, 2d, by albuminuria, or the presence of albumen in this fluid; 3d, by tubular or granular inflammations of the kidneys (Bright's disease); 4th, by uræmia, or poisoned condition of the blood; 5th, dropsical effusions; and, 6th, nervous affections, such as neuralgia, cramps, convulsions, even of the most terrible character. The validity of these opinions will be examined hereafter.

The *nervous system* exercises, as is well known, a great influence over the functions of the kidneys. From this cause, apparently, the secretion may be wonderfully diminished, so that hardly an ounce will be secreted in twenty-four or forty-eight hours: sometimes there is no visible alteration in the appearance of the secretion; while in some of these cases the urine thus diminished is very high-colored and loaded with deposits.

On the contrary, after hysterical paroxysms, mental or cerebral excitements, severe cephalalgia, etc., the quantity of urine discharged in a few hours will be enormous, being very light-colored, like pure serum, and free from deposits. This is termed "diabetes serosus vel insipidus," or "hydruria." Such conditions are temporary, depending on the ever varying condition of the cerebro-spinal nerves.

The *state of the blood* in pregnancy, and the *condition of the circulation*, also affect the condition of the urine; ordinarily the discharge is abundant, natural, and free during the latter months of gestation, arising from the constant existence of plethora, or from the excited condition of the general capillary circulation.

The altered condition of the blood, however trifling, in pregnancy, readily affects the condition of the renal secretion; hence, as formerly noticed, kyesteine is often perceived; sometimes there is an increase of the phosphates, albumen, oxalic acid, sugar, or even a greater quantity of ammonia.

Notwithstanding these and other alterations in the renal secretion, there is no positive proof, we think, that such alterations are in any way injurious; on the contrary, they are beneficial, contributing to the purification of the circulating fluid. They, however, deserve attention, as indicating the existence of hyperæmia, sanguineous or serous, which may be followed by dangerous consequences, as will be portrayed under another head.

Salivary Glands.—Salivation or ptyalism, in pregnant women, occasionally occurs. In most women, how-

ever, especially among those who suffer from nausea, the secretions of the mouth and salivary glands are more or less disturbed. The mouth is dry, clammy; the mucous secretions are viscid, adhesive, and often disagreeable to the patient, exciting a disposition to throw off rather than to swallow them. They are generally, however, clear, and apparently normal.

In a few instances there is an inordinate secretion of mucus and also of saliva; the discharge is abundant, demanding the constant use of cloths or cups for its reception, even during the night, rendering the patient very uncomfortable.

The saliva is not, however, fetid or offensive, neither is this ptyalism accompanied with turgescence of the tissues, or with inflammatory action, as in that excited by mercury; from which, therefore, it essentially differs.

This ptyalism seldom appears prior to the fourth or fifth month, but may continue to the end of pregnancy, rapidly disappearing if the foetus die in utero, and in case of abortion or labor.

The *causes* are obscure; doubtless they are connected with and aggravated by the gastric disorder, but not necessarily associated with it; as nausea or vomiting are very frequent, and salivation comparatively rare. This ptyalism also may exist with very moderate disturbance of the gastric functions.

It generally subsides gradually, but its sudden disappearance is not desirable, and may portend mischief to the child or parent.

Mammæ.—Mastodynia is the name which has been given to cases where the breasts are irregularly swollen and unusually painful, and where portions of the glands are found hardened. It is popularly denominated "caking of the breasts." It is seldom accompanied with any decided symptoms of inflammation. The exact nature of this affection is not clear; it seems to depend in some way upon the formation of milk, and its retention in some of the lobules of the gland. This hardening occurs late in pregnancy, and is seldom productive of much evil, but occasionally becomes the focus of irritation, so that congestion, inflammation, and even abscesses may be the result.

Mastodynia seems to be analogous to those enlargements of the gland which are observed in new-born infants, and also to the indurations so common in the mammæ after the birth of the child and before there is a free excretion of milk.

Nervous System.—As a general declaration, the nervous system becomes more excitable or irritable in pregnancy. By this is meant that natural or casual impressions are more readily perceived by the brain, spinal marrow and their dependencies, and by them the

functions of these organs are readily disturbed. Slight causes produce great effects, and hence very severe and even dangerous affections may be the result of powerful impressions upon the sensibilities of the patient. All portions of the nervous system seem to be more or less involved; but in particular individuals, or under special circumstances, some one portion usually suffers more severely than any other part. Thus, for example, these manifestations are sometimes in the brain or centre of the cerebro-spinal system. Hence, in women during pregnancy, the *intellectual and moral affections* are very frequently disturbed; sometimes to a great extent.

In a few women gestation has a very happy influence on their minds, particularly when the organic actions are not disturbed. They feel well, their mental powers are active, their imagination excited, so that they become more interested in reading, writing, and other intellectual pursuits, than at any former period; they become more cheerful, and more interested in the common affairs of life. In some rare instances, this excitement goes beyond the normal state: the patient becomes eccentric, perhaps delirious, or even maniacal. This constitutes one variety of puerperal mania, which may be termed hysterical.

These affections are found far more frequently in an opposite condition. The patient is sad, desponding, petulant, irritable, takes no interest in her usual avocations, often dislikes her best friends, and sometimes has a positive aversion to her husband, children, etc. Of course she is dissatisfied and anxious respecting herself and her infant; not unfrequently she has morbid apprehensions, sometimes of the most distressing character; being fully persuaded that she cannot survive her labor, she thinks it is useless to adopt any preventive measures; or she is persuaded that her child will die, will be deformed, or covered with spots or maculæ. She often sinks into a state of hopeless despondency, or melancholy. This condition depends evidently on her physical state; no declarations on the part of her physician or friends, no arguments, even when drawn from her former experience, can make any impression on the *morale* of the unhappy woman.

This state, although it may exist independently of any disturbance of the stomach, is exceedingly aggravated by the nausea and vomiting, so frequent in pregnancy, and of course by any mental or moral trial to which she may be subjected.

These mental disturbances are sometimes transient, appearing and disappearing during pregnancy,—sometimes continuing from the beginning to the end of gestation, but very generally vanishing as soon as the child is born. They are less common in primiparous

than in multiparous females; in the latter the states of mental depression and anxiety often come on during the latter months, when their digestive and other functions are in good condition.

Not only are the mental and moral faculties of the patient disturbed in pregnancy, but there are innumerable manifestations of *physical disorders*, depending directly or indirectly upon the brain, as the centre or source of nervous influence. Thus, in some women, there is merely a sense of depression, weakness, or exhaustion: they feel incapable of any physical effort. In some, these feelings of depression amount to a sense of prostration, and occasionally to syncope. Faintness, however, may occur in many women who are apparently strong, and who are not liable to this accident, except in pregnancy. Under such circumstances, they often faint from the slightest causes, even from a little mental or moral excitement, slight indigestion, sudden noises, or confined atmosphere, and sometimes from the simple idea of being away from home, or of being surrounded by strangers, etc. Syncope in pregnancy is generally very transitory; the patient soon recovers. The degree of syncope varies, being accompanied in some with the complete loss of consciousness, and forgetfulness of all the preceding or attending circumstances: in others, the patient loses her muscular powers, cannot even speak or move, and yet she is conscious of what is said around her.

Nervous tremors, or rigors, occur in some women at irregular intervals. We knew a lady who always regarded herself as having conceived, because she had a universal trembling or rigor.

In many pregnant women there is an excitation of the nerves of motion and sensation; they feel stronger, able to take more exercise, and bear fatigue better than usual. Occasionally they suffer from irregular cramps or spasms, and sometimes, when there is great irritation of the spinal marrow or brain, they have general convulsive motions, accompanied with many of those phenomena termed hysterical, giving rise therefore to one form of puerperal convulsions.

A common consequence of this excitation of the nervous system, is positive pain; the patient therefore is liable not merely to vertigo or dizziness, but to severe headaches, violent pains in the temples, forehead, top of the head, and a general soreness or tenderness of the whole scalp. These pains are sometimes excessively severe, and are termed "crazy headaches." They are often of a purely nervous character, and frequently precede the hysterical form of convulsions; but in pregnancy they may be connected with congestions of the brain, or, according to the modern theories, with the various conditions of the blood. Hence, they are

frequently the precursors of the more dangerous forms of puerperal convulsions. Neuralgia, in various portions of the body, is also very common in pregnancy. Hence violent pains are felt in the eyes, face, ears, teeth; many patients, for example, say that odontalgia or otalgia are with them evidences of gestation, not being subject to such complaints at other times. Similar neuralgic pains are often found about the chest, loins, abdomen and extremities; these, of course, are frequently aggravated by other causes, such as pressure from the enlarged uterus, irritations of the stomach, bowels, etc. There seems to be a special connection between the state of the alimentary canal and neuralgic pains and spasms of the lower extremities, etc.

The functions of the *lungs* are often also disturbed by their connection with the nervous system. Hence a sensation of tightness or fulness about the chest, a sense of oppression, of difficulty in breathing (dyspnoea). In some women these symptoms appear in the form of asthma or croup: sometimes there is a short, dry, or deep sonorous cough, frequently coming on in violent paroxysms.

The *heart* is also affected by nervous excitements. Hence pregnant women are subject to palpitations of the heart and its large vessels, and to sensations of fulness or turgescence, increasing the feelings of thoracic oppression. All these nervous affections are aggravated, in the latter stages of gestation, by the pressure of the enlarged uterus, or by tympanites, etc.

The *stomach, intestines, liver, and kidneys* have their functions greatly influenced by the condition of the nervous system in pregnancy, as we have already endeavored to show.

In the *uterus* we have often evidences of inordinate nervous excitation. This organ is often morbidly sensitive, the patient complaining from the slightest cause, as the weight of her clothes, slight jars, or even the weight or pressure of the child; its motions become not only disagreeable, but painful. This last is reported by some authors to be so constant and severe as to deprive the patient of sleep, to induce severe hysterical symptoms, and even to excite premature delivery. We have never seen any such severe cases, neither can we believe with Cazeaux that this irritable condition of the uterus was originally produced by the motions of the foetus; these last are but an aggravating cause. The excitability of the whole nervous system, and of the uterus in particular, is the real or predisposing cause, and this is generally dependent upon gestation, although sometimes the irritable condition of the uterus existed prior to conception.

Irregular pains, as well as soreness, often exist in the uterus during gestation. They are seldom con-

tinuous for any length of time. They come on suddenly in paroxysms, continuing for a few minutes, or even for hours, and then vanishing. They are very generally accompanied with contractions of the uterine fibres, as may be ascertained by placing the hand on the abdomen, and the uterus will be felt hard and rigid, which rigidity disappears when the pain ceases. These irregular, spasmodic contractions are generally known under the name of "false pains." Although they may occur early, they are more frequently observed in the latter periods of pregnancy. They differ from the "true pains" of labor, not merely in their sudden appearance and irregular character, but chiefly because they produce no effect upon the os or cervix uteri, that can be ascertained by a vaginal examination. They arise from various exciting causes, mental and physical; they are occasionally very severe, and often recur very frequently for many weeks or months before delivery. We have known women who have been confined almost entirely to their rooms for three or four months by these false pains, continually keeping up the apprehension that labor must result. Perhaps in a few cases they may hasten the period of delivery.

Pruritus Vulvæ is probably seldom a purely nervous affection, but is connected frequently with an erythematic inflammation of the mucous membrane of the vulva and vagina. Nevertheless, the itching is so troublesome and severe as to constitute the most prominent symptom. It often prevents sleep, induces great restlessness, and so disturbs the nervous system that even delirium has occasionally resulted, while the degree of phlogosis has been very trifling. The itching occasionally extends into the vagina and to the cervix uteri, and sometimes to the extremity of the rectum.

An analogous distressing itching sensation in some few individuals is experienced over the whole cutaneous tissue, from the head to the extremities. It is unaccompanied with any eruption or even redness, excepting that produced by the rubbing or scratching of the patient; and, like the pruritus vulvæ, greatly disturbs the nervous system, producing some of the forms of hysteria. Fortunately, both of these affections are not only comparatively rare, but also transitory, especially when suitable remedial measures are adopted.

The *causes* of these nervous affections have been the subject of much speculation. We have already expressed our opinion that they are originally seated in the nervous system, and are produced by a sympathy with the excited uterine tissues, precisely as hysterical manifestations appear in young girls of robust health and strength at the period of puberty, or as they are observed in innumerable cases of uterine irritation in

unimpregnated females. The sympathies are transmitted from the nerves of the uterus to the spinal and cerebral systems, by means of the sacral and hypogastric ganglia. It is certainly unnecessary here to offer any proofs of the rapid or almost instantaneous action and reaction between the uterus and the brain. Mental emotions will speedily be manifested by uterine disturbances, and irritations of the uterus be propagated to the brain, even in individuals whose organic life, fluids, etc., are in perfectly normal conditions. It is the fashion of the day, however, to attribute most, if not all, of these affections to bad conditions of the blood, designated by various words, as *anæmia*, *chlorosis*, *albuminuria*, *uræmia*, *toxiciæmia*, etc. To these theories we shall presently make some allusions.

However correct may be the views now presented of the independent character of nervous affections, nevertheless the practitioner should remember that the exciting and aggravating causes of such affections are very numerous. Doubtless in most cases they arise simply from sympathy with the excited uterus; so that the whole nervous system becomes inordinately excitable. This excitability may be disturbed by mental and moral causes, by gastric and intestinal irritations, and by all the various disturbances connected with the circulatory system; such are the excited condition of the heart and arteries, *hyperæmia*, local congestions, inflammations, altered conditions of the blood or other fluids from prior or existing diseases. In other words, the irritable condition of the nervous system produced by fecundation, may be more or less aggravated, and become serious and even dangerous from the complications thus induced.

The Blood-vessel System.—As the nervous system can be disturbed during gestation, so also may the vascular system; as the former may suffer without any or a trifling derangement of the organism, so the latter can be more or less involved without much suffering of the cerebro-spinal system. In severe cases, however, as formerly mentioned, both systems are simultaneously involved: the disturbance of one aggravating that of the other, even to a dangerous and fatal extent.

In the *early months* of gestation, where the nervous system, stomach, and other organs are not disturbed, evidences of excitement in the organic actions may, however, soon be detected. A careful observer will notice an increased activity in the local and general circulation, very gradually augmenting as pregnancy advances.

This is characterized by an increased excitement of the general circulation; the patient not only feels well, but looks well; there is greater activity in the capillary circulation. The vessels of the surface of the body

are more turgid; the skin, especially of the lips, face, etc., are more florid, while the perspiration and other secretions and excretions of the economy are more abundant; the individual appears to gain, and often does gain, not merely strength but flesh. We have known many instances of this kind, sometimes in first pregnancies, but especially in multiparous women, where the first suspicion of pregnancy was excited by feeling the motions of the child in utero, at the end of the fourth month of gestation.

Generally, however, in civilized society, the nervous system, stomach, etc., are disturbed, and with them the organic actions. A woman becomes pale, the skin contracted or flabby, features sharp, lips thin, a dark color under the eyes, sometimes with a flabby condition of the whole surface, indicating diminution of capillary excitement; the pulse is soft, yielding, frequently slow and depressed, and the woman apparently loses flesh, as well as color. This condition of the circulation often varies, however, even in the same individual, from the vacillating state of the nervous and gastric functions: when these are relieved, the circulation may become active; when they return, it is again depressed. Still, however, the general characteristic of the circulation of the blood, during the first three or four months of gestation, is that of depression, not of excitation.

In the *latter months* of gestation, where the nausea has disappeared, and particularly when the appetite and digestion are good, there is a rapid reaction of the sanguiferous system. The face loses its sharp, contracted expression, the features are developed, the color returns, the capillary excitement over the whole surface of the body is apparent, from the turgescence of the vessels, increased animal heat, tumefaction of the superficial veins, while the perspiration and the various secretions and excretions of the economy are abundant. The pulse also is developed, its depression vanishes, it becomes full and large, especially as pregnancy advances, and often quite strong, even corded, and, to the experienced practitioner, may, of itself, excite the suspicion of pregnancy. The pulsations of the heart are regular and strong; the large veins of the extremities, of the neck, etc., are evidently turgid. The flabby condition of the external tissues has disappeared; the surface has become turgid, and even tense in the young and sanguineous. In a large majority of cases, the woman feels well, is active, and able to enjoy society, and to attend to her ordinary avocations; this is especially the case in primiparous cases. Such individuals, even when brought up luxuriously, and, in some instances, even when they were regarded as weak and delicate before marriage, enjoy more health and strength than on any former occasion; they are able

to endure much exercise, and even fatigue, not only with impunity, but with advantage.

We have good reason to conclude that this is the normal state of pregnant women, judging, not from the limited sphere of individual practice, but from the general history of parturient women in all countries, and in all stages of society. Her whole system, vascular as well as nervous, is normally excited, in sympathy with the vital activity of the uterus, produced and kept up by the existence of a living being within its cavity.

Plethora, or an increased turgescence of the blood-vessels, is also a very general characteristic of pregnancy after the fifth or sixth month of gestation. This we regard as proved by the fulness of the pulse, of the capillaries, and superficial veins; by the sensations of the patient, who often complains of a feeling of distension, of fulness over her whole body, as if her hands and feet and face were distended, when no such distension can be perceived by her attendants. There is, also, a great increase of the excretions of the body, but, at the same time, nutrition is active in all the tissues. The woman, also, suffers from "flushes of heat," the face and neck become red, and eyes injected; while there is often a general sense of languor and depression, the patient complaining of weakness, weight, oppression; it is an effort for her to move about. Under such circumstances, the loss of blood, spontaneously or artificially, or a profuse watery diarrhoea, affords great relief, the woman feeling lighter and better from such evacuations.

These indications of general plethora very often exist, without any individual organ being specially concerned. Perhaps, however, in a majority of instances, this plethora is manifested more particularly in some one organ, arising from peculiar temperaments, predispositions, or exciting causes. Thus, in many instances, the *brain* suffers; the patient is heavy, dull, and is disposed to sleep a great deal; if there be any disposition to headache, neuralgia, etc., it is exceedingly aggravated, becoming very intense, especially in the temples and top of the head. Such pains sometimes come on very suddenly, and are followed by an increased determination of blood to the organ. There is frequently, also, dimness of vision, loss of sight, and tinnitus aurium, not unfrequently speedily followed by convulsions and coma, forming another and more dangerous variety of puerperal convulsions.

The *heart* and *lungs* are occasionally the seats of congestion, aggravating, therefore, the dyspnoea and oppression, with a sense of stricture and tightness across the breast. The heart feels full, distended, as if it could not act; there is a sense of suffocation, and

occasionally palpitations. The engorgement of these viscera thus aggravates all those disturbances excited by pressure from the enlarged uterus, and also those from nervous excitement.

The *chylopoietic viscera* are also liable to congestions during pregnancy, aggravating the præcordial distress, sensations of tightness, fulness, oppression, etc., induced by the enlarged uterus.

The *uterus* itself, in a very large proportion of cases, is the suffering organ; the woman complains more than usual of a fulness of the abdomen, of weight, pressure, bearing-down, a sense of uneasiness in the *bladder*, *rectum*, etc., often of an inability to stand or walk, not unfrequently of pains in the abdomen, back, hips, limbs, etc., which may be followed by severe uterine contractions, generally irregular in their action, but sometimes by regular labor-pains, producing abortion or premature labor.

The *kidneys* also are congested during pregnancy, not simply from the state of the general circulation, but also after the fifth month of pregnancy from the pressure made by the enlarged uterus on the descending cava, and also on the renal veins. The effects of such congestions on the functions of the kidneys will be presently noticed.

All these evidences of congestion, whether general or local, are aggravated by any accidental excitement; for example, any mental or moral disturbance, stimulating the brain, instantaneously increase the determination of blood to the head so as to be followed by the most severe and dangerous forms of coma and convulsions. A sudden suppression of the perspiration may increase engorgement of the heart and lungs to a dangerous extent; an attack of indigestion, especially when accompanied with a great evolution of gaseous matters, is a most common exciting cause, not merely of nausea, vomiting, gastrodynia, colic, etc., but also of cephalic and thoracic irritations. In many instances, also, they aggravate every form of uterine irritation; so that abortion or labor may be excited, involving the safety of the child or its parent. The "menstrual nisis," which, even during pregnancy, is disposed to return every fourth week, is also an aggravating cause. Hence, abortions or premature labors more frequently ensue at such monthly periods.

Such are some of the evidences of vascular excitement and plethora which characterize the pregnant state. The exceptions we believe to be comparatively few, contrary to the opinion of some of the best modern writers, who ignore the doctrine of hyperæmia during gestation, intimating that there is a general disposition to anæmia, chlorosis, or even to a poisoned condition of the fluids, during this natural physiological function

of the female economy. That there is a general excitation of the nervous and vascular systems in pregnancy, arising, sympathetically, from the increased vital activity of the uterine system, appears to us a truth of fundamental importance, theoretically and practically; it demands, therefore, in consequence of the opposition which it has lately received, still further consideration. It is confirmed, therefore, we think,

First. By the increased and rapid development of the animal economy, especially after conception, in young girls too early married. The phenomena characteristic of womanhood are enhanced, the figure spreads, and there is not only an enlargement of the uterus and mammae, but also of the adipose, muscular and other tissues; she becomes stouter and stronger, has actually a positive and rapid increase in her nutritive functions, as well as in the activity of her circulation. Some, however, have contended that this increased size, this "embonpoint," is apparent, not real; that it is owing to effusion simply, and not to real growth. This is true in some cases; and, moreover, much of the increased appearance of health and size is owing to the turgescence of the capillary tissue; but it is equally true that, in a large number of cases, where these developments are manifested, there is no effusion whatever, but the individual has actually increased in size and weight.

Second. By the fact that marriage often revolutionizes the system of anæmic and chlorotic girls. The experience of the profession has long ago sustained the general truth, that marriage is one of the best remedies for chlorosis, especially if fecundation should ensue.

Third. Another proof of the increased activity of the organic powers in gestation, is the acknowledged fact that not merely chlorosis, but that many other cachectic states of the general system, and of particular organs of the body, are ameliorated, and sometimes removed, during pregnancy. This is the case of some chronic affections of the stomach, liver, and other digestive organs, and especially where there is a predisposition to tubercular complaints. The predisposition to phthisis pulmonalis is very often eradicated by marriage; and it is a common and, we believe, a correct opinion, that there is a great retardation in the progress of pulmonary complaints during pregnancy, owing to the increased excitement and vigor generated in the economy. Many practitioners have asserted, that the life of a woman in consumption will often be prolonged while she continues to bear children. Our experience does not go quite so far; although we have observed patients improve exceedingly during gestation, yet, unfortunately, they have declined very rapidly after delivery.

Fourth. The occasional occurrence of hemorrhages, from various tissues, during pregnancy, confirms the doctrine of hyperæmia. These hemorrhages do not debilitate, but afford relief. Hence we occasionally meet with bleeding from the nose, lungs, stomach, bowels, which do not aggravate the sensations of weakness and oppression, but, on the contrary, relieve the suffering organs and the whole system. Sometimes, unfortunately, such hemorrhages occur within the uterus, which, especially when they involve the placenta, may be the cause or precursor at least of premature labor, involving the life of the infant, and, perhaps, of the mother. A still more unfortunate occurrence is the effusion of blood within the cranium, involving the functions of the brain, too frequently to a fatal degree. Such hemorrhages, attended as they are with the evidences of excitement, and a full, strong, even corded pulse, belong to those of an active character. They are not the result of debility, exhaustion, or of a passive, venous congestion; they constitute here, as in all cases of active hemorrhages, one of the natural methods of relief for engorgements; they are precisely analogous to the epistaxis or hæmoptoe often observed in young persons, and which prove beneficial to the economy.

Fifth. This doctrine is still further strengthened by the results of the evacuating treatment of parturient women. By consulting the best practical writers, both in Europe and America, the reader will be surprised at the extent to which bleeding has been carried, not merely with impunity, but with decided advantage. Dr. Dewees, of this city, in whose judgment and discretion the greatest reliance was placed, was a great advocate of free bleedings in all the congestive complaints of the parturient woman. He would frequently bleed his patients fifty or sixty ounces, or even more, in the course of a few hours. Such evacuations proved very universally advantageous, and were not followed by any deleterious effects; on the contrary, the patient was less liable to inflammatory affections, and her "getting up" was more favorable. The fact therefore that during gestation and parturition, the evacuating treatment has been so fully and successfully employed, is altogether inconsistent with the hypothesis that there is, under these circumstances, an impoverished state of the blood, and that the woman is debilitated and in a "chloro-anæmic" condition.

Sixth. The effusions of serum into the cellular or areolar tissues, into the cavities of the cranium, chest and abdomen, which not unfrequently occur in pregnancy, constitute, like hemorrhages, one of the natural consequences of plethora. We have already noticed the abundant secretions which occur in healthy women during gestation, and which, of course, must diminish,

to a certain extent, the quantity of the circulating fluid. Hence, females who take much exercise in the open air, and especially when engaged in active, laborious occupation, suffer less in pregnancy, have less disposition to œdema, and are less liable to miscarriages:—"they work off their fluids." The natural disposition to plethora is counteracted by the abundant excretions thus excited by regular muscular efforts; the blood is determined to the surface, and to the capillary tissues generally, and thus internal congestions are diminished or relieved.

If such relief be not afforded, an additional effort is often made by the increase of the natural exhalations into the areolar tissue, not merely of the lower extremity, where such effusions may occur in consequence of pressure upon the venous vessels, but into the areolar tissue in all portions of the system. Hence we have the hands, arms, face, neck, and body of the patient brought into an anasarca condition, constituting the "œdema gravidarum" of the old writers. That this is an active and not passive effusion, and that so far as it goes it tends to relieve the circulatory system, and that it is the simple result of plethora and not of anæmia in a large majority of cases can, we think, be fully substantiated.

As such effusions appear under the same circumstances which give rise to acute hemorrhage, and as they afford relief, although in a minor degree, they should be regarded as of the same type or character. Such effusions in pregnancy are precisely analogous to cases of "acute dropsy," as described by the best writers, arising from checked perspiration or inordinate excitements of the arterial system, moderate fevers, etc.

The natural disposition of the capillary system when congested to relieve itself by watery effusions, is a fact familiar to every one, and which cannot be contradicted. Wherever there is a local inflammation, even of a trifling character, there we find effusion. Cantharides applied anywhere on the surface of the body produces vesication. A furunculus or phlegmon will cause œdema in the surrounding tissues; and even when there is no active inflammation, if there be any irritation in the areolar tissue, in the serous membranes or synovial tissues, we have a rapid increase of their natural exhalations or secretions. Hence arise local dropsies, as hydrocele, ascites, hydrothorax, dropsies of the joints, etc. In all such cases, the congestive symptoms are moderated and sometimes relieved by such depositions. The flow of tears from the eyes, of milk from the mamæ, of the menses from the uterus, etc., are all the physiological expressions and demonstrations of the same important principle, that increased secretions are

the natural consequence and a relief to vascular excitements and congestions.

It is needless to multiply facts of an analogous character. The abundant secretions which take place from all the organs of the body in their normal state, the increase of such secretions in every case of physiological excitement, and the "critical" evacuations from morbid states of the circulation, are facts lying at the foundation of all scientific therapeutics.

We have a right to conclude that the œdema gravidarum is the natural result of hyperæmia and excitement; it is as natural, and its tendencies are as recuperative, as the increased discharges from the skin, kidneys, liver, etc.

Dr. Dewees regards effusions as influential in diminishing plethora, and declares that where anasarca is observed, patients are less liable to puerperal convulsions, which he regards as the consequence of congestion.

Theoretically, the same observations are true as regards effusions into the peritoneum, pleura, or arachnoid membrane. These also are the results of excitement and of plethora, and are calculated to diminish or relieve the circulation.

These ideas are generally sustained by practical authors. Dr. Wood, in his *Practice of Medicine*, not only alludes to dropsies as arising from the excited condition or inflammatory state of the serous membranes, but considers such effusions as diminishing turgescence and the liability to inflammation. Dropsies, therefore, he says, are a safeguard. Hence, in these acute dropsies evacuating remedies are valuable, in the pregnant as well as in the unimpregnated condition. Chailly regards venesection as the best remedy to prevent infiltration. Burns speaks of venesection with other evacuants as the most promising agent for the relief of ascites during gestation. Dr. Meigs also is an advocate for the same treatment, especially when combined with cephalalgia. Indeed this has been almost a universal practice.

Unfortunately, however, the location and the quantity of such effusions may be productive of secondary symptoms, which render them very dangerous during the parturient state. Ascites, for example, augments all the bad consequences arising from pressure of the large uterus, impeding the development of this organ, interfering with the functions of the stomach, intestines, kidneys, liver, etc., and predisposing, it may be, to premature labor, involving the life of the child and mother. Hydrothorax will, of course, dangerously aggravate any nervous or vascular distress in the thoracic viscera, while effusion upon the brain or in its cavities may rapidly produce vertigo, coma, convulsions, and death.

That there is a natural disposition to plethora and increased organic action during pregnancy, we regard as a general truth, applicable not merely to the strong, healthy, sanguineous woman, but also to the delicate, anæmic, and, in some instances, even to the chlorotic girl. In all such cases, if pregnancy takes place, and the digestive organs be not impaired, this natural tendency to excitement and increased irritation is manifested; the health and strength of the organic actions are to a certain extent invigorated, and sometimes a complete revolution is established throughout the whole economy.

There are, of course, many and varied exceptions to this general principle, arising from great weakness of the organism, from loss of blood, failure of the appetite and digestive powers, from prior diseases which have already so impaired the functions of important organs, or so deteriorated the vital powers of the system, that the stimulus of fecundation fails in its natural tendency, or serves to aggravate existing diseases.

It should be remembered also that there are various grades or degrees of this nervo-vascular excitation in the parturient state dependent on original temperaments or acquired constitutions; in some patients the phenomena characteristic of these states being very decided, while in others they are comparatively moderate.

That there is, during pregnancy, a state of high physiological action, is, we think, confirmed by the condition of a woman after delivery. Notwithstanding the temporary exhaustion produced by great mental and physical excitements and sufferings, and very generally by the loss of blood, sometimes to a very considerable degree, yet her organic powers speedily react with a vigor sufficient not merely for her own comfort, nutrition and strength, but also for supplying the daily-increasing wants of her new-born infant. There is an active determination to the mammæ, producing great engorgement, followed by an abundant secretion of a most nutritious aliment, fully adequate for the support and rapid development of her child, without any artificial assistance. The lactescent mother, when in health, has a good appetite, good digestion, good blood, and much mental and corporeal activity.

Again, many authors regard all women, after delivery, in consequence of the state of their organic actions and their fluids, as being predisposed to inflammatory affections; hence we so often hear of mammitis, metritis, peritonitis, phlegmasia dolens, etc.

The condition of the blood in pregnancy confirms the idea of excitement and plethora. All pathological writers have remarked that, if blood be drawn from the arm during an inflammatory state of the system, and

be allowed to coagulate, that this process of coagulation is rather slow, that the crassamentum becomes unusually dense and firm, that the red corpuscles are in greater abundance at the lower part of the coagulum, while the superior surface has elevated edges and a depressed central portion, presenting a "cup-like" appearance. Moreover, this cup-like surface is nearly free from red globules, and therefore has a yellowish color; this is known, therefore, by the expression, the "buffy coat" of the coagulum.

This condition of the blood has always been associated, in the minds of physiologists and pathologists, with a high grade of vascular excitement, or of actual inflammation.

It is a remarkable circumstance that a similar condition of the blood exists in pregnancy: the serous portions are abundant, the quantity of fibrin increased, the coagulum is large with the cupped edges and the buffy coat.

The argument therefore is strong, that as similar conditions of the blood exist in pregnancy, and in inflammatory complaints, there is an analogous condition of the general circulation and of the organic actions.

Messrs. Andral and Gavarret, however, have endeavored to obviate the force of this inference by declaring that in an opposite condition of the system, in cases of anæmia and chlorosis, *sizy* blood is also found, and hence infer that the existence of cupped blood constitutes no argument in favor of the excited condition of the patient.

This idea of a chlorotic state many modern accoucheurs have considered as applicable to pregnancy; but, we think, very erroneously. First, because the whole condition and general aspect of the pregnant woman is ordinarily very different from that of chlorosis: her secretions are abundant, her nutrition active, the temperature of her surface augmented, her color deepened, her mental and muscular powers active, all of which are directly the reverse of chlorotic women.

Second. Her blood abounds in fibrin, the crassamentum is large and of a deep red color, and the buffy coat well marked; while in chlorotic patients the coagulum is small, comparatively pallid, the buffy coat of a lighter color, and its existence by no means frequent.

In explanation of the formation of the buffy coat, it has been observed by Carpenter that it depends upon a disproportion between the fibrin and the red globules; that if the quantity of fibrin be increased as in inflammation, then it may be formed; also, that if the quantity of fibrin be stationary or diminished, as in chlorosis, with a diminution of the red corpuscles, then also the buffy coat will appear. If this observation be correct, it confirms the idea that the *sizy* blood in pregnancy is

the result of increased excitement, inasmuch as the fibrin is increased, the crassamentum is large, and the red corpuscles are abundant.

As already intimated, these opinions, more or less modified, were generally adopted by the profession, and constituted the principles which governed the practitioner. New ideas, however, have been of late promulgated. In England, Dr. Lever of London, Dr. Simpson of Edinburgh, and Dr. Cahen, about the year 1841-2, discovered albumen in the urine of many pregnant patients; at the same time, M. Rayer, in France, made similar observations, which have been more or less confirmed by subsequent observers. It was also found that there was very frequently a co-existence of this albuminuria with the anasarca condition of pregnant women; that in many instances there was a coincidence between this state of the urine and various neurotic derangements, such as cephalalgia, pains in the eyes, face, chest, loins, extremities, etc.; and that not unfrequently it existed with amaurosis, tinnitus aurium, vertigo, coma, and convulsions.

The similarity of this chain of symptoms with those attributed to "granular nephritis," or "Bright's disease," appeared so great, that much interest was excited, and further investigations were instituted; the result of which, although very diverse as detailed by different observers, yet has so far influenced the minds of some of the best obstetricians as to revolutionize their theoretical notions, and essentially to alter their treatment of the diseases of pregnancy. That judicious writer, M. Cazeaux, has been so far influenced by the results of these investigations, as to acknowledge that his views have been entirely changed. He now insists that "the functional disorders of pregnancy, hitherto ascribed to plethora, are those of chlorosis." He refers not merely to the disorders of the nervous system, as dimness of vision, cephalalgia, tinnitus aurium, etc., but also to the hard pulse, palpitations of the carotids, and local congestions, giving rise to epistaxis, hæmoptysis, uterine hemorrhages, etc. He runs a parallelism between pregnancy and chlorosis, maintaining that in both there is an excited state of the uterus, causing an impoverished condition of the blood, and the various nervous and vascular disturbances just mentioned; that pregnancy, therefore, is a state of chloro-anæmia, and not of plethora; and hence, although he acknowledges that small bleedings may occasionally be requisite, as palliatives, yet the main treatment must be invigorating, and that a nutritious diet, iron and other tonics, are the proper prophylactic, as well as therapeutic, remedies for the disorders of pregnancy.

These views of M. Cazeaux present what may be termed the modern theory of gestation; namely, that

an analogy exists between the state of the fluids and the functions of the system in pregnancy with those in anæmia, chlorosis, and Bright's disease. We cannot believe that these theories are correct, but we do believe that the practical inferences have a serious, if not a dangerous, tendency: in other words, the idea that the blood of a pregnant woman, after the fifth month, is impoverished, that she is debilitated, that she requires a nutritious diet, tonics and stimulants to increase the richness and quantity of her blood, is, as a general principle, erroneous, and therefore will be productive of much mischief. On the contrary, we believe that there is a tendency, and very generally the actual existence of increased excitement of the blood-vessels, and of plethora in pregnancy, usually observed about the fifth or sixth month, gradually augmenting to the full period, and often demanding, therefore, where the natural excretions are insufficient, the employment of evacnants, when the symptoms of plethora, general or local, are inordinate or urgent.

Such are, unfortunately, the discordant views now existing in the profession, and sustained by high authorities upon either side. Having, in the course of a long practice, acted, we believe successfully, upon the idea that there is a state of excitement and plethora in pregnancy, we have already detailed at some length the facts, which, in our opinion, confirm its correctness. It will be necessary, however, to examine some of the facts and arguments in support of the modern theory, and to determine whether they will confirm the idea of a similarity between pregnancy and chlorosis.

The new theory appears to be based chiefly on the chemico-anatomical examination of the fluids and tissues of the parturient woman. We shall present a summary of the facts adduced, that their value may be properly estimated.

We have already alluded to certain changes not unfrequently observed in the *renal secretion* during gestation. Kyesteine has been noted as a sign of pregnancy. M. Blot says that there is always a trace of sugar in the urine after fecundation; others have noticed the frequent presence of oxalic acid, and occasionally a diminution of the urea; but the chief observation, upon which attention has been fixed, is the presence or absence of albumen in the urine during pregnancy. In the healthy, unimpregnated condition, no albumen is to be found; while in pregnancy this element has often been discovered, even in considerable quantities—so often that Cazeaux ventures the declaration that it is the physiological condition of the urine in pregnancy. He also observes, if this state "be exaggerated, it gradually becomes pathological, and may be accompanied, in some instances, by granu-

lar nephritis." M. Blot, however, asserts that albumen exists in pregnancy only in the proportion of one in five, (20 per cent.,) he having met with 41 examples in 205 cases. It is well to notice that out of these 205 cases of albuminuria, there were 99 primiparæ, and 106 multiparæ; that in the former albumen was detected in 30 cases, rather more than 30 per cent., while in the latter there were only 11 cases, less than 11 per cent.

Albumen is seldom detected in the early months of gestation, and is more abundant toward term. The proportion present frequently varies; sometimes little or no albumen can be observed, while at other periods of the same pregnancy it is abundant; sometimes it ceases entirely before labor, and, what is worthy of note, disappears almost universally with great rapidity after delivery, in the course of a few hours or days. In cases where it co-exists with convulsions, it has been observed to increase during the convulsion, and diminish after its cessation. As already shown, it is far more frequent in primiparous than in multiparous females.

The *Causes of Albuminuria* are enveloped in obscurity; it is generally, however, attributed to renal congestion. When such congestions arise from inflammation of the kidney, from pressure on the renal vessels, or from any other obstruction, albumen, it is said, will appear in the urine. G. Robinson, Meyer, and Frerichs confirmed this by tying the renal veins of an animal; they found that the operation was followed by albuminuria.

It has been noticed that when there is evidence of increased congestion, during pregnancy, that the quantity of albumen in the urine often increases. It is greater in primiparous patients, where the pressure upon the abdominal veins is very great. It is remarked, also, that albuminuria is augmented during the latter months of gestation; that it increases during the throes of labor, and also during a convulsive paroxysm, diminishing after its solution; and, moreover, it rapidly disappears after delivery. Therefore, whenever congestion is great, albumen most frequently appears, and when congestion is dissipated, albuminuria vanishes. Dr. Williams maintains that albuminuria is the result of congestion simply, and that there is no organic disease. Dr. Bedford, in his late work, would refer many cases of albuminuria to congestion alone.

What is true of partial congestion, seems to be true, also, when there is general plethora.

The sudden appearance and disappearance of albumen in the urine, during the various states of pregnancy, especially during eclampsia, and its rapid dissipation after parturition, indicate also that the cause

is temporary, and not dependent upon any structural lesion, or upon any serious alteration in the blood. It is probably, says Dr. Ramsbotham, simple disalbuminization of the circulating fluid; and, it may be added, one of the evidences of hydræmia, or, at least, of local congestion.

Among the causes of albuminuria, certain states of the nervous system have been noticed. Every one familiar with disease, especially among females, has often perceived the wonderful and rapid changes which occur in the renal secretion from the ever varying condition of the nervous system. After a severe attack of nervous headache, or from some powerful moral impression, the urine, which may have been previously sparse, high-colored, or even lateritious, suddenly becomes very abundant, light-colored, and free from mucoid or other deposits. This "serous diabetes" is evanescent, and returns at intervals. There can be no doubt that other changes in the urine frequently ensue from inscrutable states of the cerebro-spinal system. Marchand states that by tying the renal nerves in the dog, congestions of the kidneys, albuminuria, uræmia, and severe nervous affections are excited. Similar experiments have been made by Brachet, J. Muller, and others, with varied results. Indeed, so inscrutable are the influences exerted by the nervous system, that we cannot hope to explain the changes which result in the urine from cerebral impressions. But it is certain, however, that the functions of the kidneys and other organs of the body are exceedingly dependent on their innervation, probably to a far greater extent than has hitherto been supposed. Hence, as the nervous system is deranged in pregnancy, the equable distribution of blood to different organs may be disturbed, congestions may be produced, and the functions of the various tissues and glands may be altered, sometimes even to a morbid extent. Albuminuria, therefore, may arise from some direct agency of the nerves, or may be the result of congestion caused by nervous influence.

The presence of albumen in the urine is so common in nephritis that "albuminuria" and "Bright's disease" have been regarded as necessarily co-existent. Hence, M. Cazeaux contends for the existence of Bright's disease in pregnancy, and believes that whenever the microscope is skilfully employed, evidences of nephritic disease will be observed. He quotes Frerichs as maintaining the co-existence of nephritis with albuminuria. MM. Blot and Depaul, however, deny that there is any necessary connection between these two phenomena. There are a large number of cases of pregnancy, say eighty per cent., in which no albumen exists in the urine, and in the remainder, say twenty per cent., nephritis

is comparatively rare. Dr. Williams also is opposed to the idea of nephritis, believing that albuminuria results simply from congestion of the kidneys. MM. Blot and Depaul, indeed most pathologists, take a similar view of this subject. Even Dr. Simpson and M. Cazeaux, although maintaining that in convulsions and other severe affections nephritis and albuminuria are very universally connected, yet they seem disposed to refer each of these affections to a common source, namely, the morbid condition of the blood. Dr. Meigs contends for hyperæmia as the cause of convulsions, and, it may be, of Bright's disease, and Dr. Bedford affirms that albuminuria is only occasionally dependent on nephritis.

The fact, already mentioned, that albuminuria and the various nervous affections of pregnant women are transitory complaints, often disappearing during pregnancy, and, with few exceptions, vanishing immediately after delivery, confirms the idea that in gestation there is no necessary connection between nephritis and the above-mentioned phenomena. Bright's disease is more permanent in its influences, disappears slowly in cases of recovery, and often terminates in death.

At the present time, it is generally contended that there is an *impoverished state, or even a poisoned condition of the blood*, when the woman is fulfilling her physiological destiny and providing for the wants of a new being in the cavity of the uterus. In proof of its altered condition, it is asserted that the proportion of water is increased, that there is a diminution of albumen and of red corpuscles, and also, occasionally, urea is present.

Respecting the increase of serum in the blood, it may be regarded as a variety of plethora, and is perfectly consistent with the idea that the blood is healthy, and abounding in nutritive material.

The blood-corpuscles are reported to be diminished during gestation. This seems to be the general testimony of scientific observers, who declare that during the first half of pregnancy the diminution goes on very gradually and slowly; but during the latter months the diminution is more rapid, especially toward term. Thus if it be assumed that the average proportion of red corpuscles in the unimpregnated condition is 112 in 1000 parts, as stated by Carpenter and by M. Regnault, this may in pregnancy be diminished, in some cases, to 90·2; but the average is generally 107·4 prior to the fifth month of gestation, and 101 during the latter four months. We find, however, that MM. Andral and Gavarret state that in thirty-four bleedings during pregnancy, the amount of red corpuscles varied from 95 to 145; one only of these 145; one only 128; six from 125 to 120, and the remaining twenty-six from 120 to

95,—these gentlemen assume the physiological standard of red corpuscles at 127.

If there be, therefore, a diminution in the amount of red corpuscles during pregnancy, the loss is comparatively trifling, not to be compared to the loss which occurs in chlorotic blood, which, says Mr. Carpenter, not unfrequently sinks "to 40 or 50," and even as low as 27 in 1000 parts. Moreover, Mr. Carpenter informs us that the quantity of red corpuscles may be diminished to 71·5, and increased to 167 "consistently with ordinary health;" and also MM. Andral and Gavarret state that of their bleedings, one-third showed that the quantity of red corpuscles was greater than the physiological standard assumed by Carpenter and Regnault. It follows, therefore, that the argument for an impoverished condition of the blood, founded on a diminution of the red globules, cannot be regarded as of great weight. It may be added, also, that the general aspect of the blood drawn from women, during labor, especially when convulsions are present, is very universally of a deep red or purplish color, and the crassamentum is large in proportion to the quantity of serum.

Again, *urea* is said to accumulate in the blood of pregnant women when albuminuria is present; that when an increased quantity of albumen is thrown off by the kidneys, there is a diminution of the excretion of urea; and hence that the elements of urea are retained in the circulating fluid, and the blood is not properly purified by the secretory action of the kidneys.

The Germans have given the name of *Uræmia* to this condition of the fluids, to which idea it should be exclusively confined. Unfortunately, however, authors have included under the word "*Uræmia*" (or *Uræmic Intoxication*) the various supposed consequences of this affection, such as effusion, neuralgia, eclampsia, etc., under the notion that these are all necessarily connected one with the other.

We find that Christison, Lever, Rayer, Braun, and others, have positively asserted that if albumen be found in the urine, urea is to be detected in the blood. A large number of authorities, however, state that there are numerous cases of albuminuria where there is no urea to be detected. Albuminuria has been found in cases of mollities ossium, measles, rheumatism, etc., and no uræmia has existed. The same is true in many cases of albuminuria connected with Bright's disease, and we have already seen that Williams and others attribute albuminuria simply to a congestive state of the renal vessels. Dr. Simpson also, who is one of the original advocates of the new theory, acknowledges that no great traces of urea can be found in the blood. This is true both as regards the presence of albuminuria in pregnancy and Bright's disease.

Many authors have attributed the supposed bad condition of the blood to other agents than urea; to a superabundance of triple phosphates, to oxalic acid, and especially to carbonate of ammonia.

Frerichs, who has devoted a great deal of attention to this subject, and who has seldom been able to detect urea in the blood, contends that by some process of "fermentation" the urea is converted into *carbonate of ammonia*; he positively affirms,—1st, in all cases of what has been termed uræmic intoxication, carbonate of ammonia can be detected in the blood; and, 2d, that if carbonate of ammonia be injected into the blood, the same symptoms can be produced. These views have not been confirmed by others, and Brown Sequard contends that carbonate of ammonia would be eliminated from the system.

If, however, as is generally supposed, urea or its elements remain in the blood in superabundance, is urea, under these circumstances, to be regarded as a poison? The affirmative has been very generally adopted by the profession; but at present great doubts exist on the subject. It has been found that in many instances where ligatures have been applied to the renal vessels, or even where the kidneys have been extirpated, that urea has seldom been found in the blood, and the animals thus treated did not manifest the symptoms of uræmic poison. Dr. Bedford has collected a large number of authorities in support of this negative opinion, especially that of M. Frerichs, who declares that the symptoms of "uræmic intoxication" do not appear when urea is detected in the blood. In one case, where a larger quantity of urea existed in one individual than in any other case which had been examined, the patient was remarkably free from these peculiar symptoms.

If, therefore, the blood be in a "poisoned" condition, the nature and quantity of the poison have certainly not been pointed out, and the inference seems hypothetical that because albumen is detected in the urine, therefore the blood is in a morbid state. Albuminuria is not really an evidence of toxicæmia.

Hydrops Gravidarum, we have already endeavored to show, is the result, either of congestion from pressure, or of a plethoric and excited condition of the general circulation. The advocates of the new theory have, however, attributed the effusions which occur in pregnancy to certain bad conditions of the blood, as evinced by the presence of albumen in the urine, and by the disease of the kidneys. Beyond the simple statement of the fact that albuminuria and dropsy are often co-existent in pregnancy, the connection between the presence of albumen in the urine, and the effusions into the cellular tissue, have not been explained. Dr. Wood, in speaking of Bright's disease,

justly observes that the presence of albumen in the urine may, possibly, explain its diminution in the blood, but throws no light on the cause of the dropsy. He further states, that if the blood be in a bad condition, it may not only produce inflammation of the kidneys, but irritation also of the areolar or serous tissues, and hence it may be a possible cause, in some instances, of the co-existence of Bright's disease and anasarca. In pregnancy, however, he says that the effusions are the result of the excited and congestive state of the blood-vessels. Such effusions, therefore, are a relief, so far as they go. This is the opinion, indeed, of almost all the old authorities, and even of very many of the present day.

On the contrary, MM. Andral, Cazeaux, Simpson, and numerous others of the modern pathologists, are of the opinion that albuminuria is the cause of effusions. M. Andral insists upon it that albuminuria is the sole cause of dropsy; Cazeaux seems to be more doubtful, as he declares that dropsy is the result, frequently, of hydræmia, while M. Blot contends that there is no necessary dependence of dropsy upon albuminuria, and states, that out of forty-one cases of albuminuria, dropsy existed in twenty-three. Dr. Rees asserts that in a large number of dropsical cases, the proper proportion of albumen in the blood has not been altered. M. Castelnau also testifies that, in cases of anæmia, he has found no albumen in the urine, but the blood was watery and deficient in red corpuscles. It appears, therefore, that albumen may exist in the urine, in many instances, without any dropsical effusion whatever; and, moreover, that the latter often occurs where no albuminuria exists. The same remark is true, also, as regards Bright's disease being a cause of dropsy. These two complaints often co-exist, but, at the same time, one may exist without the other. The conclusion, therefore, seems inevitable, that dropsies are connected usually in pregnancy, with an excited state of the vessels, with hyperæmia, or at least, hydræmia. Hence, as Dr. Rees and Dr. Wood observe, these effusions are beneficial, in relieving plethora, and preventing congestions and inflammations.

The above remarks, as regards the existence of anasarca, are equally applicable to ascites, hydrothorax, and other internal dropsies; these arise from similar causes, and, so far as the effusion is concerned, are useful. Internal dropsies, however, as formerly observed, are often dangerous, and even fatal, from their secondary consequences, pressure being made upon important and vital organs, and interfering with their functions. Thus, dropsies of the chest seriously disturb the action of the heart and lungs, while dropsies within the cranium are generally fatal,

from a partial or total arrest of the functions of the brain.

The great characteristic distinction between the dropsies of pregnancy, and those arising under other circumstances, is their rapid disappearance after labor; in a few days, the patient, however much her tissues have been swollen, is generally reduced to her ordinary size. This is true, according to our experience, even in cases of internal dropsies, provided such dropsies were dependent simply on the puerperal state.

Perhaps it will be interesting, in this connection, to state that the only case that has occurred to the author, of the absorption of the fluid in an "*ovarian cyst*," was where such dropsy commenced during gestation.

The next important question to be considered is, how far the *nervous affections*, such as neuralgia, vertigo, loss of vision, coma, convulsions, etc., are dependent upon a morbid or poisoned condition of the blood. Are they the results of uræmia? Do they constitute uræmic intoxication, as these affections have lately been termed?

So much importance has been attached to toxicæmia during gestation, as a cause of eclampsia and other nervous affections, that some additional facts, illustrative of this question, must be stated; and, first, therefore, let it be remembered that all pathologists acknowledge that spasms, loss of consciousness, convulsions, etc., can be produced, in the most healthy individuals, by powerful impressions on the nervous system. Such disturbances are more common in women than in men, and occur more frequently in the pregnant than in the unimpregnated condition.

Second. All probably will agree that spasms and convulsions are not, *per se*, evidences of an excited or depressed state of the brain or of its blood-vessels; they simply indicate a disturbance of the cerebro-spinal system. Such disturbance may arise from a "rush of blood" to the head, demanding venesection, etc., for its relief; but it may also arise from the deficiency of blood, as occurs in cases of anæmia, chlorosis, exhaustion from fatigue, purging, bleeding, etc. Hence, because amaurosis, tinnitus aurium, or convulsions, may occasionally be found in chlorotic patients, it does not follow that they may not exist in states of high health and of great plethora. Experience, certainly, declares that, it is in the latter condition that we more frequently meet with apoplexies and other congestive affections; and, moreover, that these are dangerous, while those nervous disturbances observed in patients with impoverished blood, are, comparatively, free from danger. No practitioner feels alarmed in the case of hysteric convulsions, while his fears are intensely aroused in all instances of congested or apoplectic disturbances.

The question is, therefore, to be determined to which of these states do the nervous affections, especially the convulsions, during the puerperal state, belong.

There can be no doubt that, in the early months of pregnancy, in delicate and nervous women, and in some cases during the latter months of gestation in women where there is really great weakness, hysteric convulsions not unfrequently are seen; but these, as in the unimpregnated condition, are comparatively free from danger. In a large proportion of puerperal convulsions, however, it is well known that great danger exists, arising, it has almost been universally believed, from the congestion of the blood-vessels of the brain, or from an actual effusion of serum or blood into its substance or cavities. These are strictly puerperal, and are often designated by the word "*eclampsia*." Modern theorists consider them as the result of toxicæmia, or blood-poisoning.

The direct or positive evidence of the existence of any poison or mal-condition of the blood, is, as has been shown, exceedingly meagre. Toxicæmia appears to have been inferred, rather than positively proved. Thus, it is stated, that because albumen, kyesteine, sugar, etc., are sometimes found in the urine, therefore the blood, the source of the various secretions, must be in a morbid condition; and because the menses are suppressed, the bile often deficient, the intestines torpid, therefore the blood has not been purified. An altered condition of the blood is also supposed to exist, because ptyalism has occurred; because the secretion of milk has been established, and even because the effete matters of the foetus in utero must be taken into the mother's system. Again, it has been inferred that albuminuria necessarily presupposes uræmic intoxication—in other words, that the elements of urea, or urea itself, must exist in the blood, or, according to Frerichs, be converted into carbonate of ammonia, and thus become the source of irritation to the nervous system. It has been already shown that albuminuria may exist in pregnancy, and in various forms of disease, without any appreciable alteration of the quantity of urea in the blood, or the presence of carbonate of ammonia. There is, therefore, no essential connection between albuminuria, blood-poisoning, and convulsions. Churchill says, that albuminuria may occur without convulsions, and convulsions without albuminuria. Dr. Meigs also observes that albuminuria may exist without convulsions, and many individuals, such as men, virgins, etc., may have convulsions without albuminuria. Even Cazeaux acknowledges that, in cases of albuminuria, only one in four or five have convulsions. Blot states that in his observations there were only seven out of forty-one cases; while Imbert Goubeyre states that of one hun-

dred and fifty-nine women with albuminuria, ninety-four had convulsions.

It has been inferred, also, that if Bright's disease be present, the patient will be peculiarly liable to convulsions, etc.: but the same cumulative evidence can be adduced to show that Bright's disease does not exist in a great number of convulsive patients; and the reverse, that where this nephritis does exist, convulsions are by no means the necessary consequence.

Cazeaux observes that evidences of Bright's disease can be found, post-mortem, in cases of convulsions, especially if the microscope be employed. M. Rayer does not, however, attribute it to Bright's disease, but simply to congestion. This is the opinion of Williams, and also of M. Blot. The latter gentleman asserts that Bright's disease is not the cause of eclampsia, because, in many cases of convulsions, no evidences of albuminuria or disease of the kidneys can be detected. And, moreover, that Bright's disease, and the convulsions that supervene, are generally fatal, while in pregnancy all these terrible symptoms rapidly disappear after delivery. Hence, Dr. Wood says, in treating of Bright's disease, that coma, etc., do not depend upon uræmia, because, although urea may be deficient in the urine, yet it is not found in the blood, but may be detected in the dropical effusions, or, according to some authors, in the mucous membranes; and he infers that coma arises from irritation of the serous membranes, from meningitis, or other lesions of the brain. And we have also seen that urea, even if it exists in the blood, is not universally at least a direct poison to the brain, spinal marrow, etc.

Again, it has been inferred that because there is an increase of the water in the blood of pregnant women, the circulating fluid, if not actually in a morbid state, is impoverished, as in chlorosis. It seems to be forgotten, however, that there is a positive increase of fibrin, and that although the red corpuscles may be somewhat diminished, yet their number is not below a healthy standard. The crassamentum is large and firm, with the cupped edges and buffy coat, indicative of great vascular activity, and altogether different from the small, pallid clot, with an imperfectly-formed buffy coat. And especially it has been forgotten that the whole aspect of a pregnant woman—her color, temperature of her surface, development of her capillary tissues, secretions and excretions of the economy, the nutritive processes so actively maintained for the foetus in utero as well as for her own economy, her mental and muscular vigor—is in diametrical opposition to the cold, pallid surface of the chlorotic woman, with her small and contracted capillary vessels, her deficient secretory processes, her emaciation,

langour, and weakness of her cerebral and motive powers. The parturient woman not only maintains her own organic actions and functions, and those of the child in utero, but is actually preparing a rich supply for the maintenance of the infant after birth. While the chlorotic female cannot well sustain her own organic actions, the uterus and ovaries are imperfectly developed, the menstrual secretion either completely suspended or imperfectly elaborated, and the mammae have little more than an embryonic existence. Certainly, no parallelism can be drawn between the condition of a chlorotic girl and that of a pregnant woman.

We, therefore, cannot avoid the conclusion that whatever minor changes may occur in the blood after fecundation, this fluid is healthy, free from any poisonous admixture, and abundantly nutritious. Hence, the cerebral and other disturbances, whatever may be their real origin, are not to be referred to toxicæmia under any of its supposed forms.

Experience, we think, confirms the views just stated, as we have already mentioned. The treatment recommended by experienced practitioners is based upon the idea that plethora and excitement constitute the general condition of the parturient woman. The direct or indirect evacuating treatment has been very universally adopted. This, indeed, is true even as regards the advocates of the chloro-anæmic theory. They resort to the lancet and other evacuants in all the serious complications attending gestation and parturition. In severe congestions, therefore,—in convulsions, etc.,—they acknowledge that there is no opportunity for purifying the blood, and that the safety of the patient demands immediate resort to bleeding. This is almost the universal practice in decided cases of eclampsia, sanctioned by Cazeaux, Tyler Smith, Simpson, and other supporters of the toxicæmic or uræmic theory.

It is now generally acknowledged that, in puerperal convulsions, much benefit will result from the use of narcotic and anæsthetic remedies, after general or local plethora have been relieved. Dr. Simpson and others place much reliance upon chloroform. These measures operate promptly and often very decisively. Opinions may differ as to the *modus operandi* of these agents, but certainly it cannot be imagined that they have any power to neutralize or eliminate poisonous matters in the blood. It is far more reasonable to suppose that they diminish nervous and vascular excitement by a direct impression upon the cerebro-spinal system, rather than by purifying the blood and thus indirectly removing the cause of nervous excitement.

On reviewing what has been said respecting the symptoms of pregnancy and the condition of the fluids

during this process, the following conclusions may be succinctly stated:—

First. That the uterus and its appendages are in a state of vital erection; that its nervous and vascular systems are excited, and that the organic actions are increased, for the development of the tissues of the parent, and for the sustentation and growth of the foetus.

Second. That in consequence of this uterine excitation, the cerebro-spinal system of nerves is disturbed, the sensibility is exalted, so that the mental, moral, and the physical condition of the woman is easily excited or depressed,—she becomes “nervous.”

Third. That the general vascular system, the organic life, is also excited. The capillaries become more active; nutrition, secretion, and excretion are augmented. This increased activity of the organic actions is often manifested at the beginning of gestation, gradually augmenting until the full period. In those cases where there is much nausea, loss of appetite, indigestion, there are few or no evidences of this activity in the capillary circulation, which is often depressed. When these symptoms, however, vanish, when the appetite and digestion return, the reaction is decided, and the nutritive functions become active.

Fourth. That there is a natural tendency to general vascular fulness or plethora in all cases of normal gestation, resulting from the increased activity of the organic actions, and the greater demand made upon the animal economy for the sustentation, growth, and development of the new being in utero.

Fifth. This tendency to hyperæmia is usually counteracted by the materials furnished to the foetus; by the free secretions and excretions, and also, in many instances, by the increased development of the mother's tissues.

Sixth. That not unfrequently actual plethora does exist. This hyperæmia is often relieved, or at least moderated, by an increase of the cutaneous, renal and other secretions, and also by the effusion into the areolar tissue and occasionally into the serous cavities. In more decided cases it gives rise to hemorrhages, the blood being effused upon some of the mucous surfaces, or unfortunately into the cavities of the head, chest, or abdomen.

Seventh. That under the general idea of plethora should be included a large majority of cases in which the watery elements of the blood are in excess, with some diminution of the red corpuscles. In such cases, although the woman is pallid, and often anasarcaous, nevertheless, her health and strength are good, and her nutritive functions are well executed. The foetus also is well developed, and may be born healthy and strong.

This has been termed serous plethora, and, like other varieties of hyperæmia, is often productive of serious complications, such as effusions within the cranium, chest, etc.

Eighth. The presence of albumen in the urine is no positive indication of nephritis or toxicæmia in the pregnant woman. This circumstance is merely the result of renal congestion, or of general plethora.

Ninth. In a large majority of cases of gestation, there is not only plethora, but also an increase of the nutritive elements in the blood, as may be inferred from the active growth and development of the foetus in utero, and the excellent appetite, digestion, nutrition, health, and strength of the mother.

Tenth. There are, of course, many exceptions to these general declarations. Many women from their original or acquired temperament and constitution, from the loss of blood, from acute or chronic diseases, are truly anæmic and chlorotic, and their blood is impoverished. In such cases there is a diminution of vital power. Examples may be readily found, among the extreme poor and also among the wealthy and luxurious, especially in large and populous cities, of individuals whose physical education has been neglected, and whose organism has never been properly developed. During pregnancy, therefore, they may require nutritious diet, tonics, and even stimulants to increase their vital power and the nutritious character of their blood. But even in such cases there will be, we think, a strong natural tendency to reaction, and also to what is properly termed plethora; that is, an increased quantity of the circulating mass; it is not, in this case, loaded with nutritious elements, but, although deficient in these respects, the watery element is superabundant. This is the serous plethora of Madame Lachapelle, the hydræmia of late writers. Both these tendencies, therefore, may be productive of mischief, especially by inducing dropsical effusions in the cavities of the body. Although a good diet and tonics may be demanded, yet alteratives, laxatives, diuretics, etc., are indispensable, not to eliminate a poison, but simply to relieve this hydræmia or serous plethora.

The second condition of the circulatory system is *morbid excitement*. The normal excitements of the vascular system in pregnancy, are comparatively seldom inordinate, although there is a constant increase of organic action, and a constant tendency to plethora.

This natural excitation and hyperæmia, however, may be productive of mischief, from various causes, arising from the temperaments and constitutions of individuals, from their degree of bodily vigor, and from the unfavorable circumstances in which they may be placed.

The common causes of disease, such as exposure to cold, errors of diet, contagious virus, etc., may excite inflammatory or febrile diseases during gestation. Such diseases, therefore, are often more severe, tedious, and difficult to manage, in consequence of the irritability of the nervous and vascular systems, and the disposition to hyperæmia. More active evacuations are demanded to promote "resolution," and to prevent the natural tendencies to congestion, effusion, and inflammation.

Again, in women who have been brought up delicately, who are "nervous" or hysterical, and especially where there is little disposition to secretion in the skin, kidneys, etc., a febrile state is often engendered by fecundation, without any apparent cause, except the mere fact of uterine excitement, as existing in gestation.

Such excitements are generally manifested toward the middle of pregnancy, and are very constant, frequently not terminating until after delivery. They simulate the form of nervous or hectic fever, with morning remissions, and evening exacerbations. Seldom, however, is much or any relief obtained from perspiration or other evacuations. The patient complains of great heat upon the surface, flushings of the face, thirst, loss of appetite, torpor of the bowels, and a dry hot skin, with restlessness, loss of sleep, and distressing nervous feelings. Nevertheless, the symptoms are all moderate, not often confining the patient to her bed, or even to the house. She is anxious for fresh air, cool, or even cold bathing. The author attended a lady, whose sensations of heat were so distressing, and whose skin was so dry, that she was continually resorting to the shower-bath, sometimes in the middle of the night.

There seems to be every grade of this morbid ex-

citement, arising during pregnancy—from mere sensations of heat to forms so severe that patients will be confined to their beds, and excite fears for their ultimate safety. In such instances, however, few or no evidences of plethora are presented, and, after delivery, there is a solution of the fever without ultimate bad consequences. The patient's "getting up" is, however, tedious, and very seldom do the mammæ furnish any nutriment for the new-born child.

We have thus endeavored to present the physiological character of pregnancy, its symptoms, the changes which occur in the organism, and also the gradual, and sometimes sudden, transitions from a normal to an abnormal condition, from troublesome and painful sensations, to positive and dangerous disease.

Although, therefore, married women, who bear children, have their peculiar diseases and dangers; yet, nevertheless, it is the experience of the profession that, upon the whole, they enjoy more health and more vigor than those who remain sterile, and more frequently survive to old age. The stimulus given to the economy by pregnancy is generally beneficial, augmenting the recuperative and tonic powers of the system. Even the delicate, the weak, and anæmic woman may become strong and plethoric.

Practitioners, also, regard married and prolific women as, upon the whole, more healthy, and as having a better prospect for long life, than the unmarried. In conformity to these views, Mr. Montgomery, in his erudite work, *On the Signs of Conception*, observes "that pregnancy acts, in a great degree, as a protection against the reception of disease." It is also well known that it has a tendency to delay the march of chronic diseases, especially of phthisis pulmonalis.

CHAPTER VI.

MANAGEMENT OF PREGNANT WOMEN.

THE management of pregnant women, both in their physiological and pathological states, must be founded on our knowledge of the natural tendencies of the economy, and of the various circumstances or causes which may interfere, to a greater or less extent, with the welfare of the woman.

In this way, suitable and scientific indications for the treatment of the complaints of gestation may be clearly pointed out.

First. Many of the disorders of pregnancy arise simply from *pressure*; the indication, therefore, is to diminish, if possible, such pressure, to alter its direction, or to adopt measures to palliate its influences, inasmuch as pressure must exist, and be continually increasing, until the full period of gestation.

Something can, occasionally, be done to diminish pressure, by removing, for example, the feculent accumulations in the rectum, and in the colon; by relieving tympanites; by promoting the absorption of fluids effused into the cellular tissue, or serous cavities; and, also, by removing any tight ligatures, bandages, corsets, etc., from the person of the patient.

The direction of the pressure may be changed by altering the position of the woman, especially by placing her in bed; and also by means of external or abdominal, or, it may be, by internal or vaginal supporters.

We can often palliate, also, many of the symptoms, where we cannot directly diminish or alter the direction of the pressure from the enlarged uterus.

These general observations are applicable to the different tissues or organs which may suffer from this cause during pregnancy, as, for example,

Bladder.—The dysuria of early pregnancy may be palliated by a recumbent position, occasionally by elevating the uterus, by means of a finger in the vagina, or sometimes by means of pessaries, when a more permanent support is required.

If there be a retention of urine, the catheter must be employed, care being taken not to excite irritation, but to pass the instrument, corresponding to the altered direction of the urethra, upward and behind the symphysis.

In the latter stages of pregnancy, the bladder may

be sometimes relieved by means of a suitable bandage to elevate the lower portion of the uterus, so as to diminish the pressure against this viscus and the bones of the pubis.

Vagina.—The various congestions of the vagina, with the consequent leucorrhœa, as also the occasional prolapsus of this tube, can be moderated by frequent recourse to the recumbent position, by elevating the uterus, and by the use of cool and astringent washes.

Rectum.—Pressure upon this intestine may be diminished by analogous measures, especially by the recumbent position, pessaries, etc. When, however, in the latter stages of pregnancy, the rectum becomes distended with feculent matters, and the bearing-down efforts of the patient are unavailing, the fæces should be removed by enemata, by operations with the finger, with the scoop, etc.

Abdominal Muscles.—The tension, soreness, neuralgia, spasms, etc., of these tissues can be palliated by rest and position, by removing tympanites, costiveness, effusions, etc., and also by frictions with the hand alone, or with warm oleaginous and anodyne embrocations.

Hernia of the Intestines.—This demands, in pregnancy, the usual treatment; hence, attention to the digestive organs, removal of flatulent and feculent accumulations, and the employment of pressure to prevent, diminish, or restrain the protrusion, are all important. In some few instances, a general abdominal bandage may be used to support the parietes of the abdomen, and to prevent the formation of umbilical hernia. Generally, however, such bandages will be useless, if not painful. Pressure, therefore, by means of elastic trusses, should be directed to the hernial spot. These, however, are very inconvenient, and often very unmanageable during gestation. We decidedly prefer, therefore, placing over the umbilical ring a thick compress, generally made of firm material, and securing it by a broad band of adhesive plaster, extending from one side to the other. This keeps up a uniform, steady pressure, at the same time it does not interfere with the comfort or motions of the patient, or the gradual development of the uterus.

Vesical Hernia.—If this should occur through the inguinal or crural rings, trusses are valuable in preventing its return. Should, however, the bladder be protruded downward through the orifice of the vagina, the symptoms may be palliated by the recumbent position, occasionally by the employment of the catheter, and sometimes by the use of a large circular disc pessary.

In those rare instances where there is a displaced position of the bladder, so that this viscus, instead of rising above the symphysis pubis, is distended in the pelvis, underneath the uterus, we can palliate chiefly by a recumbent position, and the occasional use of anodynes, especially per rectum.

Displacements of the Uterus.—In the early stages of pregnancy, prolapsus, anteversion, and retroversion of the uterus are often observed, and demand, we think, the same treatment as in the unimpregnated state. Hence, if such accidents are not speedily relieved by the recumbent position, by elevating the uterus with the finger, and by removing any accessory or aggravating cause, pessaries of suitable size and form should be employed, until at least the third month of gestation; then the uterus, from its increased size, is so elevated, that prolapsus or retroversion is no longer possible. This practice, of course, must be executed with much care and attention, so as not to irritate the uterus by the operations of the practitioner, or by any undue pressure from the pessary.

The importance of this treatment will be obvious, when we remember the danger of abortion and the consequent destruction of the life of the fœtus, so often produced by these displacements.

Obliquities of the Uterus.—In the latter stages of pregnancy, the obliquities of the uterus, which are not unfrequently observed, can be palliated by attention to position, and by diminishing, as far as practicable, any distensions of the alimentary canal. In cases, however, of anterior obliquity of the uterus, great comfort is experienced by the use of a suspensory bandage, the pressure of which should be confined to the lower portion of the abdomen, so as to elevate the uterus, and perform the duties of the relaxed abdominal muscles.

Hemorrhoidal Tumors.—When these occur in pregnancy, they seldom disappear entirely till after delivery, owing to the congestion of the pelvic veins, kept up by the pressure of the uterus. They, however, can be palliated by the usual treatment—by laxatives, cold enemata, and also by cold astringent and anodyne lotions. When external, painful and turgid, they may be punctured by the point of a lancet, so as to penetrate the cyst, which affords far more relief than the application of leeches.

Anasarca of the Lower Extremities.—This is the result of passive congestion of the venous vessels from the pressure of the uterus on the vena cava, etc. When disconnected with general œdema, it can be partially obviated by rest and elevated position of the limbs, and by diminishing the fulness of the intestinal canal by means of laxatives and carminatives. Some advantage may be obtained, in a few individuals, by sponging the limbs with cold water, followed by gentle frictions. Generally, however, more good will result from oleaginous liniments, and by warm pediluvia, or by warm fomentations or baths to the limbs, so as to facilitate a free perspiration. Occasionally bandages or laced stockings may contribute to the comfort of the patient. If the distension of the skin be very great, threatening inflammation or sphacelus, punctures may be made through the cutis vera, for the evacuation of the fluid, keeping the patient afterward at rest, so as to prevent any disposition to erysipelas. Such punctures are said to be occasionally requisite in the anasarcous condition of the labia majora. We have, however, not met with such instances, neither have we found that the distended labia afforded any obstacle to the delivery of the child.

Varices of the lower extremities, whether existing alone or in combination with anasarca, demand similar treatment, by rest, position, bandages, etc.

Nerves.—The numbness, stiffness, pains and spasms, so far as they are excited by pressure, may be palliated by frequent change of position, by exercise, and also by simple or stimulating frictions to the back, nates, and lower extremities; great care should be taken by laxatives, etc., to remove any additional irritation from the crural and sacro-sciatic nerves.

Functional disturbances of the bowels, stomach, kidneys, heart, lungs, brain, etc., so far as such disturbances arise simply from pressure, cannot be obviated to any great extent, the cause continuing and even increasing until after delivery. Something, however, may be done by attention to position, by regulating the diet, keeping up the regular peristaltic motion of the bowels, and also by increasing the actions of the various secretory organs, especially of the liver, kidneys, stomach, bowels, etc.

Secondly. *SYMPATHETIC DISORDERS*, or those arising from sympathy with the excited uterus. These cannot always be distinguished from the effects of mere pressure, especially as they are often co-existent. Nevertheless, an analysis should be made so as to form distinct indications for proper treatment.

Irritability of the bladder may demand general remedies, such as mucilaginous drinks, diuretics, altera-

tives, etc., to correct the condition of the urine. In other instances, local remedies are chiefly to be relied upon—such as fomentations, poultices, vapor baths, warm sitz-baths, and occasionally the use of narcotics to the rectum, to the vagina, etc.

Irritable or Inflamed Vagina, Pruritus Vulvæ, are troublesome affections, and occasionally so severe in pregnancy as to demand general treatment—venesection, saline cathartics, low diet, etc. Generally, however, local warm bathing, fomentations, mucilaginous and oleaginous injections to the vagina, followed by mild astringent and anodyne lotions, are sufficient. No wash to the vagina or vulva is more grateful than the solution of borax and morphia. When the disease is obstinate, solutions of sulphate of zinc, acetate of lead, nitrate of silver, tincture of iodine, and the “yellow wash” become valuable.

The *rectum* may be relieved from irritation not only by elevating the uterus by the finger, by pessaries in the vagina during the early stages of pregnancy, and by removing scybalous collections, but also by the use of mucilaginous enemata, of laudanum or other anodyne injections, and by keeping up a regular laxative condition of the intestines.

Constipation must be obviated by attention to diet and laxatives. These last should be exhibited in small quantities, and very regularly at stated intervals, so as to encourage a regular peristaltic movement of the alimentary canal.

Flatulency may be obviated, not merely by laxatives and attention to diet, but also by alkaline articles in combination with carminatives, assisted sometimes by tonics, so as to insure a better digestion.

Lientery, or the rapid discharge of undigested food, is best obviated by the preparations of opium, so as to quiet the morbid activity of the muscular coat of the bowels, care being taken to prescribe simple and very digestible articles of diet.

Diarrhæa, serous, mucous, or bilious, depending as it often does in pregnancy on the general irritability of the nervous system, as well as on that of the intestinal canal, demands also a cautious use of anodynes. Let it not be forgotten, however, that such discharges are often beneficial during gestation. They are often substitutes for perspiration, for deficiency in the urinary secretion, or even for anasaruous infiltrations. Hence, their sudden arrest may prove injurious; there may be a metastasis to the head, chest, or abdomen, producing effusions of serum into these cavities, with the usual dangerous or fatal consequences; or actual inflammation may result in some of the tissues or organs of the body. Hence, although anodynes may be used, assisted by antacids and astringents, yet they should be pre-

ceded by the use of alteratives, laxatives, etc.; or in some instances they may be entirely omitted, unless the strength of the patient is evidently failing.

Stomach.—We have formerly detailed numerous reasons why the nausea and sickness of pregnant women should be regarded as a variety of “nervous dyspepsia;” although, of course, there may be aggravating causes and occasional complications with other diseases.

The Indications of Treatment therefore, are to diminish the general and local irritability of the nervous system. These may be fulfilled indirectly, by diminishing the influence of the internal irritation, and by removing any accidental or aggravating cause of gastric disturbance, or directly by remedies addressed to the general cerebro-spinal system, and more particularly to the nerves of the stomach.

The nervous irritability of the stomach may be sometimes diminished *indirectly*, as,

1st. By attending to the natural or essential cause of gastric disturbance in pregnancy—the vital activity of the uterine system.

Very little can be done, and very seldom should any attempts be made to diminish the normal or physiological actions of the uterus after fecundation, as much mischief might result.

It is possible, however, that these excitements may be inordinate, so as to aggravate the gastric distress, and even to endanger the safety of the infant. In such cases it may be to some extent advisable to diminish the inordinate actions of the uterus by general bleeding, by laxatives, or locally by means of leeches, and anodyne enemata.

2d. Secondary or aggravating causes of sickness are numerous. The nausea is often kept up, and painful retching produced simply from gaseous accumulations, demanding the free exhibition of hot drinks, and occasionally they may be rendered more efficient by the use of all the varieties of carminative remedies, such as infusions of the various aromatic herbs and spices, essential oils, etc. Dr. Dewees was partial to an infusion of cloves, and occasionally ventured even to employ the spirits of turpentine, he says, with advantage.

Acidities usually abound in the digestive passages; demanding the employment of the various alkaline preparations, which may often be advantageously given in combination with carminatives.

Quantities of undigested food often remain in the stomach, keeping up constant nausea, and the patient is unable to eject these irritating matters: her efforts should be assisted by copious quantities of hot water; if this be not sufficient, there can be no objection to

the use of mild emetics. No apprehension need exist of any bad consequences to the uterus, as the vomitings thus excited, especially when plenty of water has been given, are more easy than those so constantly recurring in pregnancy. Many authors are opposed to the use of mild emetics; but we see no objections to their judicious employment, especially if there be no great plethora, which, should it exist, ought to be previously relieved by the lancet.

Constipation should be obviated by simple enemata and mild laxatives.

The accidental co-existence of *gastritis*, acute or chronic, with pregnancy, should receive an appropriate antiphlogistic treatment, by general or local bleeding, revulsives, etc. Indeed, we have known great relief afforded by such evacuations in cases of congestion of the "portal system," where there was no actual inflammation.

The *direct* measures for removing the irritability of the stomach may be addressed to the general system, or more particularly to the digestive apparatus. As respects the general nervous system, some few details will be presently given when speaking of the affections of the cerebro-spinal system during gestation; at present it is sufficient to observe that as the nausea of pregnant women is greatly under the domain of the sensations and mind of the patient, much can be done by removing every source of mental or moral disturbance. Hence arises the necessity of change of scene and of occupation; the importance of cheerful companionship; the removal of any disagreeable or disgusting object which might possibly affect the senses of smell, sight, hearing, and even touch, thus disturbing her imagination, and, secondarily, her physical condition.

The "fastidious tastes" and "longings" may, to a certain extent, be gratified, and yet if they be denied, no apprehension need exist of any bad consequences to the infant.

It is, however, more particularly to the stomach that remedies must be addressed to diminish its irritability. This may be done by,

First. *Stimulants*.—Of these the best is a solid, nutritious diet, especially of animal food. This natural stimulus should be taken early in the morning, if practicable, and, even if rejected, may be repeated, for the stomach suffers less, if solid food can be retained. It is rendered more grateful by the addition of condiments, of any kind agreeable to the patient, such as horseradish, mustard, spices, etc. Vegetable articles are seldom to be given, as they are flatulent and acescent, inasmuch as the development of gas and acid exceedingly aggravate the nausea and retching.

It is a good rule not to allow the stomach to be

empty; hence, after vomiting, food should be taken and repeated at comparatively short intervals during the day, and sometimes even during the night.

With many patients, nourishment in a fluid or gelatinous form is preferred, and may be rendered more grateful by peppers, spices, etc.; such are the preparations of farinaceous articles, of milk, broths, and soups carefully deprived of oil or fat.

Artificial stimulants are not only useful, as condiments, but must often be given by themselves. Under this head we may include all varieties of effervescent drinks, which are generally very grateful. Iced champagne often proves very useful; good wines have been much used, but even the best of them are usually too acescent. Hence, to most patients, alcoholic beverages are far more acceptable, and very generally contribute much, not merely to relieve nausea and vomiting, but also the distressing gastric and other nervous affections. It has been recommended by MM. Rayer, Moreau, and Jacquemier, in bad cases, where there is great nervous prostration, to urge their use, even to intoxication. This, however, seems to us an abuse of a good remedy, in a moral as well as a physical point of view.

As substitutes for the alcoholic stimulants, strong infusions of the spices, preparations of the essential oils, spirits and carbonate of ammonia, and other analogous articles, may be advantageously resorted to. With some individuals a strong cup of tea or coffee is very grateful and efficient.

Under this head of stimulants we may also include rubefacient and other revulsive applications, particularly when applied to the epigastric region.

Second. *Antispasmodics and narcotics* are very valuable in quieting nervous irritability of the stomach in the early months of gestation. Care should be taken to suspend their use, whenever there are any strong indications of internal congestions, especially of the brain. The treatment should be commenced with the milder articles, such as preparations of ammonia, ether, camphor, hyoscyamus, etc.; while, in severer cases, some of the preparations of opium may be positively demanded for the comfort of the patient. Perhaps no one article has been more successful with us than the saturated tincture of the root of aconite, in doses of two drops, three or four times a day. This was first suggested to the author by his friend, Dr. John F. Meigs.

In the use of narcotics, as of stimulants in general, great care should be taken not to generate bad habits, enforcing the idea that all such measures should be regarded as temporary, not permanent expedients.

Third. *Tonics* may be advantageously substituted for stimulants, and even for narcotics, in the form of bit-

ter infusions, extracts, tinctures, etc. Of these, none perhaps are so useful as the preparations of quinia.

In this point of view, the importance of fresh air, exercise, bathing, etc., should not be forgotten.

Such are the usual remedies; but, of course, there may be very aggravated cases, where the nausea and vomiting are indomitable, sometimes continuing to the full period of utero-gestation, preventing the reception of sufficient nourishment, and inducing great sensations of languor, lassitude, nervous, and even organic depression. It is most wonderful, however, that such prostration, very universally, is more apparent than real; women, under these circumstances, may bear very large and vigorous children, and, after delivery, may rapidly recuperate their forces, and afford abundant supply of nutriment for their infants. The author has never met with a dangerous, or, of course, with a fatal case of nausea and vomiting during gestation; nevertheless, such cases are upon record, and not a few practitioners have either been so much alarmed themselves, or have yielded to the fears of the patient or her friends, as to recommend and practice artificial delivery, in the early or later months of gestation, for the safety of the parent. It would be presumptuous to say that such practice is never justifiable; we fear, however, judging from what has passed under our own observation, that such practice has been carried to a very reprehensible extent.

Women are naturally timid, and, during gestation, this timidity is aggravated, and the woman often sinks into a state of hopeless despondency and despair; she is confident that she cannot survive her pregnancy, and insists that something must be done for her safety. She realizes not the importance of the life of her embryotic and unborn child, and demands, without any scruples of conscience, its sacrifice for her welfare. Too often, the ignorant or the empirical practitioner yields to her suggestions, or even, perhaps, may himself excite them, and thus immolates upon the altar of ignorance or cupidity lives, which both the mother and the practitioner are most sacredly bound to protect.

Nevertheless, are there not cases in which delivery is absolutely necessary for the preservation of the mother? This question, says M. Cazeaux, is one of the most difficult which can be presented to an accoucheur.

On the one hand, Denman and other practitioners relate cases in which death has resulted from nausea in pregnancy. M. Dubois even speaks of the different stages of the disorder, as,

First. Indomitable vomiting night and day. Second. Fever, with acid breath, etc. Third. Neuralgia, cerebral symptoms, hallucinations, disordered vision, coma, death.

Moreover, it is stated by Merriman, Blundell, and Churchill, that premature labor has been successfully practiced. Cazeaux, and some of the German practitioners, have also known the operation to be successful.

On the other hand, numerous physicians of extensive experience have never met with fatal cases of vomiting.

It is also universally admitted that patients may go to the full period of utero-gestation, be delivered of vigorous children, and completely recover their own health, where nausea and vomiting continued almost without interruption even to term. Indeed, patients have recovered when their cases have been considered desperate by the most eminent practitioners. A very interesting case is recorded, where such men as MM. Dubois and Chomel regarded the situation of a German lady as desperate, yet she recovered without any bad consequences. We know, also, that such recoveries are often very sudden, showing that no serious lesion has existed.

Again, if those in favor of the operation have recorded successful cases, there is reason to believe that the unsuccessful ones have been too generally concealed. As Cazeaux states that out of seven cases of the operation of which he had knowledge, six died; although in some of them the vomiting was relieved by the delivery.

In addition, therefore, to the doubtful prognosis which must exist in every case,—both, first, as to the final result to the patient without an operation, and, secondly, as to the dangers resulting from such manual interference to the mother—if we take into consideration the important life of the fœtus, which must always be sacrificed if the operation be performed in the early months of gestation, and is always endangered, even if performed during the latter months, we must conclude that premature delivery can be very rarely justified; and it certainly ought not to be executed without the most careful investigation, by educated and experienced practitioners, of all the circumstances involved.

Prior to the seventh month of utero-gestation, M. Cazeaux, in view of the above facts as to the unsuccessful character of the operations for abortion, the certainty of the death of the embryo, and the great probability that the mother and child will survive, if there be no interference, declares “that the operation should be rejected as irrational.”

After the sixth month, when the child may be regarded as viable, the operation may, perhaps, in some very grave cases, be justifiable; although it is impossible to specify the peculiar combination of symptoms

which may render such an important step advisable. We certainly have not met with such a case, neither have we heard of any practitioner in good standing in this city who has been so unfortunate.

In one case we ventured with great hesitation to induce premature labor at the seventh month of uterogestation, where there was every evidence of the fœtus having been dead for nearly two months, and where the nausea and vomiting which had been incessant, night and day, for four months, still continued distressing, even after the death of the fœtus. The mother was immediately relieved, recovered perfectly, and has since borne healthy children, without any peculiar suffering.

Still further, in opposition to the propriety of premature labor, it may be added that in cases of post-mortem examinations of supposed fatal cases from nausea and vomiting in pregnancy, accidental complications have been found, such as peritonitis, inflammation, and ulcerations of the stomach and bowels, etc., showing that pregnancy was but an aggravating and not the essential cause of a fatal issue. The existence of such lesions may explain also why the operation has been so frequently fatal.

Liver.—The torpid condition of this organ, dependent as it often is upon the nervous system of the patient, has sometimes been benefitted by nervine remedies. It is found, also, that good has resulted by favorable changes in the mind and feelings of the woman; change of scene, of conversation, of company, have often dissipated not merely despondency and anxiety of mind, but also gastric distress and the torpid condition of the biliary function. Generally, however, such sedation or torpor demands the use of alterative measures, such as the alkalies and small doses of the mercurial and iodine preparations, in conjunction usually with laxatives and even diaphoretics. These may be assisted, frequently, by mild tonics, and especially by some of the mineral acids; also by revulsives to the right hypochondrium, and by tepid or warm bathing.

The biliary secretions are occasionally superabundant, and, especially where they become acrid and irritating, demand laxatives and alteratives; for it must be borne in mind that, during gestation, it is always dangerous to arrest suddenly any of the secretory functions. They are useful in relieving congestions, either local or general, and, if arrested, there may be a determination or metastasis to more important organs.

Nevertheless, the judicious use of opium and its preparations, of chalk, and even of astringents, may be sometimes advisable; care being taken that the bowels shall not remain in a costive state after the suppression of the bilious diarrhœa.

Salivary Glands.—Salivation, however disagreeable or distressing to the patient, ought not to be interfered with, except by the mildest measures, such as tepid or mucilaginous washes to the mouth, with the addition, it may be, of small portions of the vegetable or mineral acids; and also by the use of mild alkaline or oleaginous liniments externally. Any measures calculated to diminish or suppress the salivation may be productive of positive mischief; other organs of the mother may suffer, and even the process of gestation be interrupted. The increased flow of saliva, as well as that of other secretions during pregnancy, must be considered as advantageous, whether we regard such discharges as simply to diminish plethora, or to eliminate some noxious matters from the fluids.

Salivation, or ptyalism, may sometimes be lessened by the evacuating treatment, thus diminishing general or local plethora; and also by rectifying the condition of the stomach, with which the mucous membrane of the mouth and the adjacent glands are so intimately connected.

Mammæ.—Mastodynia should also be treated by palliatives, such as simple anointings, fomentations, poultices, and unirritating plasters. Where there is much soreness, anodyne liniments, plasters of opium, belladonna, or other extracts, are useful; if there be much inflammation, leeches may be applied, while any general excitement of the arterial system, or inordinate plethora, may be removed by appropriate measures: but all powerful revulsive treatment to the breast, by cold and astringents, should be very carefully avoided for fear of metastasis.

Nervous System.—As there is an unusual excitability of the nervous system in pregnancy, the great and important indication is to diminish this excitement by direct or indirect measures.

First. *By indirect measures.* These include all the attentions requisite for removing any of the aggravating sources of irritation. Hence, attention should be paid to the gastric distress, constipation, and all other irritations of the intestinal canal. Hence, also, any unusual tendency to congestion, plethora, inflammation or fever, should be obviated.

Upon the same principle of removing causes, much attention must be paid to avoid all mental and moral excitements, and all inordinate sexual gratification. Nothing should be addressed to the eye, ear, mind, or imagination of the woman, which may unusually or unpleasantly affect her brain; thus all disgusting or disagreeable objects, the sight of disease, and of deformed persons, should be carefully avoided, for although such subjects may not produce any deformity or maculæ upon the infant, yet they can so interfere with

the welfare of the mother as to injure her health, and disturb or even arrest the process of gestation, so that the infant even may perish or, at least, premature delivery be excited.

Second. *By direct measures.* These may also be very important in diminishing irritability, as,

First. By *moral regimen*, not merely by removing all excitement, but also by occupying the mind of the patient as far as practicable with pleasant subjects of thought. Hence, will be seen the importance of cheerful and well regulated conversation, of select companionship, and of suitable reading, turning the mind of the patient as far as possible from everything relating to her own situation or to the histories of gestation in other individuals.

In those comparatively rare cases where the patient feels perfectly well, and her mental powers are excited, sometimes inordinately, more than usual attention should be paid to moderate any inordinate indulgence even in her intellectual pursuits, and to insist on quietness, and a full proportion of rest and sleep.

Second. Care should be taken in all cases of nervous irritability to maintain by *tonic regimen* the strength of the patient, or to increase it should there be any diminution of her vital powers. Hence, in all cases where the patient's constitution is naturally delicate, where she is anæmic or chlorotic from accidental causes or improper physical education, or where she has been exhausted by acute or chronic diseases, tonic regimen becomes exceedingly important to maintain her forces and thus diminish the excitability of her nervous system. Hence, a good solid, nutritious diet should be advised, and assisted, it may be, by condiments, or even by the use of malt, vinous and alcoholic drinks. Tonics, however, should very generally be preferred, and the ferruginous articles alone or in combination with bitters are generally recommended.

This practice should, however, be pursued with much discretion; for although there are many patients whose natural or acquired constitutions may render such treatment necessary during the whole of gestation, nevertheless, in a large majority of cases, it should be restricted or entirely abandoned after the fourth or fifth month of utero-gestation. At this time the anorexia and gastric distress usually disappear, and there is a reaction of all the organic actions, with a natural disposition even to become excessive, and sometimes, as we shall presently see, demanding an opposite mode of treatment.

In all cases, no bad consequences will result from a judicious resort to exercise in the open air and bathing, which, while they improve the tone of the system and diminish nervous excitability, facilitate an increase

of the secretions and excretions of the body, and thus lessen vascular excitement and fulness.

Third. Occasionally, when the symptoms of nervous irritation are urgent, *antispasmodics and narcotics* may be resorted to for palliating the sufferings of the woman; the practitioner should be frugal in their use, always beginning with the mild articles, and employing the stronger narcotics only in cases of emergency. He should insist upon the idea that such measures are mere temporary remedies, and caution his patients as to the danger of their habitual employment.

In the severer forms of nervous affections, especially where there is a disposition to hysteria and hysteric convulsions, the preparations of camphor, opium and ether are very valuable; but of late years the inhalation of ether or chloroform has been resorted to with very beneficial results, and by many considered as preferable to the internal exhibition of narcotics. This is doubtless true in many instances; but much care should be exercised in the selection of cases, especially that they should be essentially hysterical, and not complicated with congestions or with diseases within the head or chest.

Such is the general treatment for cases of purely nervous disturbance during gestation. The experienced practitioner will have no difficulty in accommodating his practice to the innumerable modifications of nervous excitements as manifested more particularly in the different organs and tissues of the economy. Thus, in all the *cerebral* excitements, whether arising from moral or physical causes, we should be careful not only to remove the cause, and directly to palliate these excitements with the remedies mentioned, but also to revulse to other organs and tissues, by suitable agents, such as warm applications, rubefacients, etc., to the extremities, the back, neck, etc., and by enemata, laxatives, etc., to take away all irritations from the stomach and bowels. Advantage may also be gained by the external use of opium, belladonna, and other narcotics, to the temples, neck, etc.

Similar attentions are important in cases of palpitation of the heart, dyspnoea, and all the varieties of præcordial distress dependent upon the nervous system.

When the uterus suffers from "false pains" or other symptoms of uterine irritation, it is very important to moderate or relieve such excitements for fear of abortion or premature labor; the practitioner should, in such cases, the causes being removed and the circulatory system in a good condition, employ narcotics, even freely, by the rectum or the stomach, so as to prevent mischief to mother or child.

Similar treatment, assisted by warm fomentations, poultices, and other revulsives, is often demanded for

the relief of otalgia, odontalgia, and other neuralgic affections in the face, chest, abdomen, and extremities. Spasmodic affections of the voluntary muscles may often be palliated simply by removing intestinal irritations; but they also occasionally require a judicious use of narcotics. Where there is a general itching over the whole surface of the body, M. Cazeaux recommends alkaline baths, particularly of the carbonate of potash, in the proportion of five ounces to a full bath.

It may be well to remark that in cases of odontalgia the practitioner should not too readily yield to the anxieties of his patient for relief, and allow severe operations to be performed upon the teeth. Such operations, although occasionally requisite, may do mischief by their sudden impression upon the nervous system, and are often ineffectual, as the pain is not connected always with the tooth, but may depend upon the general neuralgic condition of the cerebral nerves.

The practitioner also should be very careful, especially in all irritations of the brain, that his narcotic remedies are not contra-indicated by vascular plethora or excitement, as otherwise the most dangerous consequences might result. By some, therefore, opium has been considered as a poison in pregnancy, particularly where the brain is concerned. Hence, care should be taken, by bleeding, leeches, cups, purgatives, etc., to relieve congestions prior to the administration of narcotics.

Blood-vessel System.—From the discussion which we have presented, as to the condition of the organic life in pregnancy, it appears that in the early months it is frequently depressed. There is anorexia, nausea, vomiting, and other symptoms of dyspepsia, with coldness and pallor of the surface, diminished excitement of the heart, arteries, and capillaries, and, at the same time, nervous symptoms are predominant. In the latter stages, however, there is a reaction of the economy; the appetite returns, digestion is good, the circulation becomes active, the blood nutritious and abundant; and hence result warmth and heat to the surface of the body, and increase of the secretions, excretions, and nutrition, usually also with an abatement of the nervous, or hysterical symptoms.

Of course, there are innumerable modifications of these conditions, arising from temperaments, constitutions, physical education, habits, and modes of living, and also from complications with morbid states, commencing before or even after fecundation.

Hence, in some instances, the excitements, nervous and vascular, begin immediately after conception, and continue, to a greater or less degree, during the full period of utero-gestation. Hence, also, in other cases, the gastric distress, and the depression of the organic

life may continue, with little intermission, even to term; the woman being weak, anæmic, and, apparently, much exhausted; yet, even in such cases, there is wonderful tenacity of life, and a strong disposition to reaction, should there be any intermission of nausea or vomiting, and especially if, from any cause, delivery should occur. Moreover, even in such cases of apparent exhaustion, there is often a tendency to increased fulness of the blood-vessels, although the blood is augmented, not so much by the increase of its solid elements, as of its serous portion, constituting serous plethora, or hydræmia. Not unfrequently, in these cases of exhaustion, the infant is well nourished, and born active and vigorous at the full period of gestation.

In the treatment, therefore, of the organic life, during gestation, much judgment is required to accommodate our practice to the ever varying condition of the system. The leading and important indication, however, after quickening, is *to moderate the natural tendency to excitement and plethora*, or to reduce hyperæmia and excitements when they become inordinate.

To fulfil the indication of moderating any manifested tendencies to plethora, attention should be paid,

First. To the diet of the patient. After the nausea has disappeared, the appetite should be indulged to a considerable degree, in order to replenish the vessels, and counteract the losses sustained during the first months of gestation. A good substantial diet, therefore, should be allowed, sometimes during the remainder of gestation; but perhaps in a majority of cases of healthy individuals, during the last six weeks, the tendency to fulness and excitement is so great that the use of animal food should be limited, and sometimes entirely abstracted.

Second. By favoring the activity of the various secretions and excretions of the body. Hence, will be seen the great importance of laxatives, and occasionally of diuretics and diaphoretics. Hence, also, we must urge our patient to take exercise, not simply by gestation, but especially by walking, in order to maintain an active capillary circulation, internally and externally, and thus, by favoring secretions, we not only diminish excitement and plethora, but also the disposition to internal congestions, determining the blood from the interior to the exterior.

Exercise, also, as we have already hinted, while it thus diminishes plethora, increases the strength of the patient, and, of course, diminishes the excitability of her nervous system. It should, however, be carefully regulated, so as not to induce great fatigue, nor to excite neuralgic or spasmodic pains, particularly of the uterus.

Tepid bathing, or sometimes cold bathing, has similar beneficial influences, diminishing inordinate excitements, facilitating indirectly the secretory functions, and, at the same time, increasing the strength; any sudden shocks, however, disturbing the nervous system, should be avoided.

Hot baths are seldom, if ever, proper, as they inordinately stimulate the sanguiferous system, and may cause active congestions in important viscera, especially in the brain and uterus.

By these, and similar hygienic measures, the natural tendencies to excitement and plethora may be obviated, local congestions may be prevented, the strength of the woman be preserved, and she may pass through the whole period of gestation without any serious inconvenience. This is, indeed, very universally the case amid the thousands of parturient women in civilized, as well as in savage life, whose naturally good constitutions are strengthened by exercise, or even by labor in the open air, and whose secretions and excretions are so abundant, that vascular excitement and hyperæmia, either general or local, are moderated.

Nevertheless, from various causes, even among the laborious classes, but especially among those who are in "easy circumstances," surrounded by the comforts of life, and not compelled to make any physical exertion, so much excitement and plethora are often observed as to render direct evacuations absolutely necessary for the welfare, and often for the safety of both mother and child.

Such evacuations must, of course, be varied, according to the temperament and constitutional strength of the individual, the degree of excitement and plethora, and especially in reference to the importance of the organ more particularly involved.

I. *Venesection*, immediate and free, is often, therefore, imperiously demanded, when the symptoms are sudden and severe. Congestions of the brain, for example, so frequently followed by loss of vision, and of consciousness, and marked by coma and convulsions, of the most terrific character, demand the most direct and speedy evacuation, so as not only to relieve the engorgement, but especially to prevent the effusion of serum or blood, which is so likely to prove fatal at the time, or to permanently injure the cerebral functions. If the congestion be relieved before effusion takes place, the patient's recovery may be generally anticipated. Similar decisive treatment, although not usually to the same extent, is demanded for the viscera of the chest, and, still more frequently, for the uterus, where great engorgement may be followed by hemorrhage, abortion, or premature labor, involving the life both of the child and its parent.

The remark has already been made, that females, during pregnancy, endure such evacuations in a most wonderful manner, better than at any other periods of their lives. References to practical authors verify the truth of these remarks, which is also confirmed by the testimony of women, who often express their great sense of immediate relief from the loss of blood; they "feel lighter;" an oppression is removed from the mind, as well as the body; feelings of despondency and intense anxiety are thus often instantaneously dissipated.

Venesection, however, should not be confined to extreme cases of dangerous engorgement, but may frequently be employed in minor cases as a prophylactic, and no doubt with the greatest advantage. The timely loss of blood, assisted by other measures, have doubtless prevented dangerous engorgements, and saved a multitude of lives. In many instances, however, direct depletion must be very moderately resorted to, as a prophylactic, or be reserved for more severe forms of visceral congestions.

II. *Cups and leeches* are often very important as substitutes for general bleeding, or they may be employed after such bleedings have been carried as far as may be prudent.

III. *Purgatives* are very valuable, not merely to relieve constipation, but as direct evacuates by increasing the various secretions of the stomach, liver, intestines, etc. Hence, the simple hydragogue cathartics, especially the various saline remedies, are important, as producing free, watery evacuations from the bowels. Still more efficient are the mercurial preparations, particularly when there is any great torpor of the hepatic functions. These last, however, must be used with caution and reserve during the pregnant state.

IV. *Diuretics* are a more uncertain class of remedies, yet, when they operate, they are exceedingly efficient in relieving nervous and vascular excitements. Under their influence, relief is often rapidly afforded, not merely to plethora, but also to the dropsical effusions, which are so frequently its consequence.

V. *Diaphoretics*.—The promotion of free perspiration, by mild diaphoretic remedies, assisted by warm drinks, warm pediluvia, tepid baths, etc., is advantageous, directly by diminishing plethora, and indirectly by determining the blood from the interior to the exterior.

Such are the powerful measures at command to moderate the tendencies to excitement and plethora, or to reduce them when actually present. The kind of evacuation, and the extent to which it should be carried, in particular cases, must be left to the judgment of the practitioner; the general principle, in all cases,

is simply to diminish the plethora, but not to reduce strength. It is only in extraordinary cases of danger, that depletion should be carried so far as to diminish, to any extent, the vital powers. When the organs are "oppressed," and not "depressed," it is requisite to remove such oppression, and thus prevent mischief.

Moreover, it will be found that all such depletory remedies are decidedly the most efficacious in relieving the consequences of plethora and excitement. Hence, under their influence, far better than by any other measures, the dropsical effusions into the cellular and serous tissues may be dissipated; and by them, and often by them alone, can we relieve the neuralgia, the spasms, the cramps, the loss of vision, the tinnitus aurium, the intense cephalalgia, the coma, the convulsions, and other nervous affections incident to pregnant women during the latter periods of gestation.

While hyperæmia exists, all other remedial measures are futile or positively dangerous. Opium and anæsthetics, those special boons, from a good Providence, for the relief of pain, will act simply as poisons, if administered when there is great engorgement of the cerebral tissues. They will augment the congestion, and facilitate seroid or sanguineous effusions. After depletion, however, they manifest their great and benign power by diminishing cerebro-spinal excitements, and thus preventing, rather than augmenting congestion.

We believe that these principles, under judicious restrictions, are equally applicable to those parturient women who, from original temperament, from improper modes of living, from bad physical education, from disease, or other cause, are really depressed, possessing feeble vital powers.

It has already been shown that, even in such cases, pregnancy has a *tendency* to excite the organic actions, and to induce plethora; not always true sanguineous but serous plethora, that is, hydræmia, which, as in other cases, may be followed by effusions, and, not unfrequently, by painful and dangerous nervous affections. We have even the support of M. Cazeaux himself to substantiate this opinion. He declares, as we quoted upon a former occasion, that "hydræmia is the most frequent cause of those functional disorders of pregnant women, which have hitherto been attributed to plethora."

The delicate and very important practical question arises—how are such cases to be managed? In accordance with the principles laid down, we say, by *evacuating remedies*, so carefully chosen, and so judiciously employed, as to carry off the superabundant fluids contained in the blood-vessels, or effused into the cellular tissue, without any further diminution of the strength

of the patient. This, we maintain, is all important, as without such treatment there is imminent danger of effusions within the head, thorax, or abdomen, always dangerous and often fatal.

In urgent cases of hydræmia, especially where coma and convulsions are manifested, direct depletion by the lancet, to a certain extent, may be necessary to preserve life. This, indeed, has been practically acknowledged by almost every advocate of the chloro-anæmic or toxicæmic theory of pregnancy. Experience teaches that relief may be thus afforded, and that other measures are inefficient. The loss of blood diminishes congestion, and thus prevents or relieves effusion. We have no other solution of its beneficial influences; for the loss of eight or twelve ounces of blood can have no immediate efficacy in purifying the blood. If this fluid be in a poisonous condition, the poison still remains after depletion. On the principle of removing the poison, no relief could be afforded.

Seldom, however, is venesection requisite, especially if the patient has been properly supervised by her accoucheur.

Hence, the welfare of the patient, in all cases of "serous plethora," with or without effusions, will be best promoted by mild evacuants or alteratives. By these the various secretions and excretions of the body can be augmented so as to diminish the amount of the circulating fluid, with the indirect effect of promoting the absorption of all preternatural effusions, and, at the same time, moderating any existing nervous disturbances. Such practice, by relieving local congestion, diminishes the danger of effusions upon the brain, or other viscera, and thus greatly contributes to the safety of the patient.

The treatment now indicated is often all that may be demanded in moderate cases of debility and anæmia; inasmuch as there is a natural disposition to reaction, which may rapidly ensue after the plethora has disappeared. In most cases, however, the debility is so great that the vital powers of the patient require assistance to favor this reaction. Hence, a diet of animal food, tonics, and occasionally even stimulants, may be most advantageously administered to restore the strength of the patient and to increase the richness of the blood. The practitioner here, as in ordinary cases of dropsy, while he resorts to cathartics and diuretics, is anxious to support the strength of his patient by invigorating measures.

While we agree, therefore, with the advocates of the chloro-anæmic theory, in putting confidence in preparations of iron, bark, and other tonics, and in a good diet: yet, we cannot believe that such measures are prudent, without being combined with remedies calcu-

lated to relieve plethora and its consequences; and we must entirely dissent from the idea that a tonic and invigorating practice is indicated merely because effusions occur, or albuminuria is detected, or severe neuralgic sufferings exist in the head or other parts of the body. On the contrary, although such practice may sometimes be resorted to with impunity, yet it is fraught with the utmost danger in ordinary cases of pregnancy, and it can only be tolerated in cases of great depression and positive weakness.

Our practice for years past, even among ladies enjoying the luxuries of life, and whose constitutions have been enfeebled by a bad physical education, has been regulated by the above principles. Ordinarily, toward the last weeks of gestation, we diminish the nutritious character of the diet, often removing entirely the use of animal food, abstaining from tonics and stimulants, and paying great attention to promote the various secretory functions. If these measures be not sufficient, and any urgent symptoms be present, we have unhesitatingly resorted to direct depletion with the lancet. The cases have been comparatively very rare where we have thought it requisite or safe to administer even the milder tonics during the latter months of pregnancy. There are cases in which tonics and even stimulants may be important; but certainly their influence should be well watched, for fear of congestions of the brain and their terrible consequences, which might be suddenly developed.

There are sometimes *febrile affections during preg-*

nancy, arising from common causes, which should be treated like other cases of idiopathic or symptomatic fevers. The accoucheur, however, should bear in mind the natural tendency to plethora and to local congestions, which must therefore aggravate the symptoms of fever and inflammation, and also that evacuations can be borne much better than under other circumstances.

It has, however, been remarked that a kind of nervous or hectic fever exists in some females, simply from the fact that they are pregnant. The excitations of the uterus are apparently the only cause. Such fevers begin toward the fifth or sixth month of gestation, continue until delivery, and then usually disappear immediately, without any bad consequences. The practice in such cases must be simply palliative, the cause remaining operative. Such patients, therefore, must be given only mild diaphoretics, laxatives, diuretics, refrigerants, etc. These may be assisted by cool acidulated drinks, tepid or cool bathing, and occasionally by driving in the fresh air. These measures may sometimes be assisted by small doses of opium or other narcotics, to quiet nervous irritation, or to prevent any inordinate evacuations. Tonics also may be occasionally exhibited, while the diet of the patient should be so regulated as to maintain her strength without augmenting the febrile symptoms. Should the fever at any time disappear, a good diet and tonics may often be requisite to maintain or restore the strength of the woman.

CHAPTER VII.

LABOR.

HAVING given a sketch of the important phenomena characterizing normal or uterine gestation to its completion, we must now consider, in detail, the wonderful process by which the foetus, fully developed and prepared for a new mode of existence, is extruded from the mother's body. This process being usually accompanied with much suffering and muscular exertion, has been termed "labor." It may be defined to be that function of the female economy by which the uterus expels the ovum.

DURATION OF PREGNANCY.—This has been the subject of much discussion. The decision of this question is often of the greatest importance in a moral and legal point of view. The character of a woman and her offspring, and their legal rights, are often dependent upon the opinions of obstetricians as to the duration to which human pregnancy may possibly be extended.

The popular notion, that human pregnancy extends to nine calendar months, is probably correct. Dr. James Reid, from forty-three cases, in each of which there was

but a single coitus, states that the average time of delivery was two hundred and seventy-five days. Under similar circumstances, Dr. Montgomery places the average at two hundred and seventy-four days, and Dr. Matthews Duncan at two hundred and seventy-five days, or thirty-nine weeks and one or two days. This regularity is in conformity with the usual periodic changes of the animal economy, where there are no disturbing agents. It is probable, therefore, that in the natural states of society there is not usually much deviation from this generic law. There is difficulty, however, in the human species, of ascertaining the precise period of conception, which may occur at any time from the disappearance of the menses until the time proper for their reappearance—a space of some three weeks. Dr. Merri-man and others have endeavored to ascertain what may be termed the average time of conception. This may be stated at seven to ten days after the disappearance of the menses, inasmuch as he found that the average period of delivery was two hundred and eighty to two hundred and eighty-three days, dating from the day on which the menses were last seen. Merriman's rule, therefore, we have found to be the best practical guide. Labor, according to our experience, generally occurs two hundred and eighty or two hundred and eighty-three days after the last appearance of the catamenia.

Nægelë's mode of computation brings us to the same results. He advises that in order to determine the month and the date at which labor should occur, to count backward three calendar months, and then to add seven days; or, as Dr. Bedford would illustrate it, if the catamenia would finish on the 10th day of January, we may go back to the 10th of October, and, adding seven days, we shall have the 17th of October as the day when labor should commence.

The popular mode is not very dissimilar, which dates the commencement of pregnancy as usually occurring about midway of the interval between the disappearance and the time for the reappearance of the menses, and then allowing nine calendar months. The simplest rule, however, based upon the facts accumulated, is to allow ten lunar months, dating from the disappearance of the menses; especially as labor, whether premature or at term, is more apt to occur at a menstrual period.

The exceptions to this rule are very numerous; labor is often accelerated by various agencies, mental, moral, or physical; while, on the contrary, it may be retarded from unknown causes for many days or weeks. Thus, Merriman states that in women who have apparently gone to full term there is often a variation of fifty-four to fifty-six days, some carrying their children three hundred and six days, and some only two hundred and fifty-six days. Dr. Dewees men-

tions a case where there was but a single coitus, and that within a week before the menstrual period, in which delivery did not occur for nine months and thirteen days, or about two hundred and eighty-six days. Desormeaux mentions a case of an insane lady, in which delivery ensued at the expiration of nine months and a half, say two hundred and eighty-nine days.

The interesting and important question as to what may be regarded as the extreme duration of pregnancy, cannot be positively determined. In the celebrated Gardner peerage case, in which the leading accoucheurs of England were consulted, the legitimacy of a son born three hundred and eleven days after fecundation was not acknowledged. Nevertheless, there are many cases upon record of pregnancy prolonged to at least ten months. Most practitioners have met with such instances. A lady of this city, the mother of many children, always insisted she carried them ten months; in one case her friends and physician were perfectly satisfied upon this point, and her infant was not born until ten months after the departure of her husband from home. A lady, under our own care, terminated her menstrual period on the 21st of January, 1843. Early in February she had nausea and other indications of gestation. She was not, however, delivered of her infant until the 17th December, 1843: that is, eleven calendar months *minus* four days; equal to three hundred and thirty days after the disappearance of the menses, or forty-seven weeks and one day. It would seem positive, therefore, in this case, that pregnancy lasted at least three hundred and two days, dating from the 18th of February, at the time when the menses should have recurred; but as symptoms of pregnancy existed for some two weeks previously, it is possible, and even probable, that some twenty or twenty-five days might be added; which would extend the time to three hundred and twenty-two or three hundred and twenty-seven days.

Many cases of retarded pregnancy are upon record. Heister states that women are sometimes not delivered before the eleventh month. Velpeau records one in his own practice, in which delivery occurred on the three hundred and tenth day. Mauriceau states that out of four hundred and five cases, at the Hôtel Dieu, the term of pregnancy varied from six months to eleven months and eight days.

There can be no doubt, therefore, that human gestation can be prolonged; but the period is still undefined. This is in accordance with careful observations, made on the lower order of animals. Tessier, in France, found that gestation may be prolonged in cows and mares; in the former, whose period of gestation is the same as

that in the human female, the difference between the extremes in one hundred and sixty cases was sixty-seven days; five of them were not delivered until the three hundred and eighth day.

Under the head of retarded gestation those cases where the child has perished in utero, and become encysted in its own membranes, ought not to be included. Such instances are very rare, as the uterus almost invariably throws off its contents at or before the ninth month. Dr. Dewees quotes, however, two cases, in one of which the child was carried for nearly twenty-six months in the cavity of the uterus. This was verified by a post-mortem examination, at which evidences of metritis and peritonitis existed. In the second case, the mother was still living at the last report, dated two years and five months after fecundation.

Founded upon facts now detailed, and others of analogous character, the French code has decreed that every child born after the one hundred and eightieth day, or before the three hundredth day after marriage must be considered as legitimate; if born after the three hundredth day, its legitimacy may be contested.

It will generally be found that in cases of retarded pregnancy in women, that children are more vigorous and more fully developed.

When labor is accelerated from any cause the children are generally less developed and more feeble. In many instances, however, strong and healthy children are delivered before the usual term. As a general rule, the more premature the labor, the more imperfect, physiologically, is the fœtus. Hence, it is generally affirmed that if a child be born before the end of the sixth month, that it is not "viable;" to this, however, there are, doubtless, many exceptions, as many instances are recorded of fœtuses born before this period which have survived. An interesting case has lately occurred to the author, of a lady, delivered December 5th, 1861, of twins, whose conjoint weight was six pounds and seven ounces. The lady is confident that conception could not have occurred before the 12th of May, she having been absent from her husband until that time, and on the 1st of May her catamenia had been regular and abundant. The pregnancy, in this case, could not have been longer than two hundred and seven days, and may have been of shorter duration. This case is remarkable, as children in twin cases are usually more delicate and feeble than in cases of single pregnancy. In another, which came under the observation of the author, a lady had her catamenia in the beginning of August, and her infant was born on the 23d day of January following. Here, allowing seven days for the flow of the menses, gestation could not have exceeded one hundred and sixty-nine days. The infant

was exceedingly small, but was preserved by careful attention. She has grown up to womanhood, and has always enjoyed excellent health and strength.

CAUSES OF LABOR.—The interesting question arises—why should labor ensue at the termination of the tenth lunar month after fecundation? What are the causes of labor?

These have been, by systematic authors, divided into two general heads,—the exciting or determining causes of labor, and the proximate or essential causes. The latter may, however, be considered under the general name of the powers or forces by which labor is accomplished; as the proximate cause has generally been referred to the contractile efforts of the uterus.

The "*immediate*," "*exciting*," or "*determining*" causes of labor, are natural or accidental.

First. *The Natural Causes.*—These, being those by which this process is excited, at a determinate period, are in reality unknown. It is a law of the animal economy, which, like other laws of vital beings, was impressed upon the embryo at its creation. In proportion to the development of its tissues and organs, one manifestation of vital power after another is successively presented in the different stages of its existence to fetal maturity, and afterward, during life, according to the various circumstances into which it may be thrown. Hence, immediately after birth the process of respiration is established. Then comes primary dentition; at the seventh year of age, the progress of secondary dentition commences; at fourteen, the phenomena of puberty—all agreeably to the original fundamental laws of the system; the causes are altogether inscrutable. It is in vain, therefore, to join in the speculations of physiologists to explain the occurrence of labor at a particular period. No additional information is given by saying that there is an antagonism existing between the longitudinal fibres of the uterus and the circular fibres of the neck; that when the former succeed in overcoming the latter, labor is established, or that there is a "magazine" of fibres, which being exhausted, contractions must ensue, or that the mere distension of the uterus to a given size is a sufficient explanation, or that the fœtus, by its own efforts, brings on labor.

We must content ourselves with the declaration that when the fœtus is mature, uterine contractions spontaneously occur for its expulsion.

Speculations of recent writers are by no means more satisfactory, or better supported by facts, than those of their predecessors. The theory of Mr. John Powers, promulgated in 1819, to which much attention has been given, and which has been sanctioned even by the name of Dubois, has been completely refuted by several

authors, and in our own country by Drs. Dewees and Bedford. He contended that there is a strong analogy between the uterus, the bladder and rectum; and hence, as soon as the ovum, from the disappearance of the cervix, comes in contact with the os uteri, the pressure of the ovum stimulates the circular fibres, and these react upon the body of the organ, causing its contraction, and all the phenomena of labor. This is, however, contradicted by the following facts: that labor often comes on at term, before the canal of the cervix has disappeared, and, of course, when there is no pressure upon the os; that in transverse and other malpresentations of the child, where there is also an absence of pressure, labor comes on with as much regularity as in favorable presentations; that when, as in many instances, the ovum presses upon the os, and even when this orifice is patulous and relaxed for several days or weeks, no labor ensues; and, finally, that in extra-uterine pregnancies, as well as in normal gestation, where the fœtus is dead in utero, the phenomena of labor often occur at the ninth month. These facts are destructive to the theory. Neither is the analogy to the bladder much more pertinent; in both cases, it is true, there are circular fibres acting as sphincters, and longitudinal fibres, which are antagonistic, but the sphincters of the rectum and bladder are under the direction of the will; those of the uterus are not. The "stimulus of distension" is the exciting cause of the action of the bladder and rectum. In the uterus there is no stimulus of distension. This assertion, we know, is contrary to the opinions of most authors, who speak of the uterus being distended by the ovum. We contend, however, that there is no active distension from the beginning to the end of pregnancy, for the following reasons:

First. The uterus enlarges during the first week of pregnancy, and also in cases of extra-uterine gestation, when there is no ovum in its cavity.

Second. If the uterus were distended by the ovum, there must be a corresponding compression made upon the embryo, for any force, sufficient to distend the uterus mechanically, must react upon its contents. This reaction upon the delicate embryo, or even upon the fœtus at an advanced stage of pregnancy, would interfere with its functions and developments, and even with its existence.

Third. If the uterus were passively distended, like the bladder and rectum, by its contents, its walls would become more and more thin, which, every one knows, is not the fact, for the parietes of the uterus are thicker at the fourth or fifth month of utero-gestation than at the commencement, and, although they afterward become thinner, yet there is no evidence that this arises from any internal pressure.

Fourth. The uterus, excepting when the fibres are contracting, is never firm and tense during gestation; on the contrary, it is soft and relaxed. Hence, in examinations per vaginam, no tension is perceived in the walls of the uterus, through which the presenting part of the child can often be felt; also, a hand applied externally recognizes no tension in the walls of the uterus; these are, on the contrary, so soft and so flexible as to accommodate themselves, to a certain extent, to pressure—the form of the womb being frequently altered by the motions of the mother, and by the position of the child in the uterus. Indeed, this flexibility of the parietes of the uterus is so great that sudden and rapid changes are excited by the spontaneous motions of the fœtus, visible to the eye, as well as perceptible by the hand. Delicate women are often suspicious that their situation will be detected by the bystander from these sudden changes or irregularities in the form of the uterus.

Fifth. In many instances, during the latter periods of gestation, the os uteri is so relaxed or partially opened that the membranes can be felt by the finger; they will be found uniformly soft and free from all tension. This fact, every practitioner knows, is also true during the process of labor; as soon as the contractions intermit, the membranes become relaxed, and often thrown even into folds, the "bag of waters" apparently disappearing.

Sixth. The idea of distension is altogether inconsistent with the known delicacy and weakness of the tissues of the ovum, especially in the early stages of pregnancy; they could not tolerate any force capable of dilating the uterus, with its hard, dense tissues, but would rupture and give rise to abortions. In many cases, even at the full period of utero-gestation, when the membranes are stronger than ever, a rupture of the membranes often occurs from the first "insensible" contractions of the uterus, and a discharge of the waters ensues as the primary symptom of labor. Every practitioner knows, also, that in many cases of labor, the bag of waters is ruptured by the slightest pressure of the finger.

We must believe, therefore, that there is no passive enlargement of the uterus, during pregnancy, from any internal force; that, on the contrary, it grows during gestation; that its tissues are rapidly developed, under the influence of the stimulus of a living organized body within its cavity, which excites all its organic actions in the most wonderful manner. While the fœtus lives, the uterus enlarges; when the fœtus dies, its development ceases. There is no analogy, therefore, between the enlargement of the uterus, during pregnancy, and the passive development of the bladder or rectum from

their contents; and hence, in opposition to the opinion of Mr. Power, there is, we believe, no evidence of a "stimulus of distension," acting either on the circular or longitudinal fibres as the determining cause of labor; nor even is there any pressure from the weight of the ovum sufficient to excite the circular fibres of the uterus to contraction, as the primary act of labor.

Dr. Tyler Smith has applied the modern theory of "ovulation," as a cause of menstruation, to explain the determinate cause of labor. He states that the excitement produced by a reflex influence upon the ovum causes so much irritation and congestion of the uterus as to excite its contractions, and thus the successive phenomena of labor. He contends that the process of ovulation exists during pregnancy, periodically, as in the unimpregnated state, and, by the ninth month, the excitement is sufficient to cause labor. But, as M. Cazeaux well inquires, why does this not occur at the seventh or eighth month? or, why, in some instances, is it not postponed till the tenth or eleventh month? Why should labor, therefore, occur always at the ninth month, if it be entirely dependent on ovulation?

Neither has it yet been proved that ovulation does occur during pregnancy. Although, it may be true that a "menstrual nismus" does frequently occur during pregnancy, or even that there is a disposition for labor to take place more frequently during such menstrual effort than at any other time, yet these are but accessory, and, by no means, uniform agencies. It cannot be regarded as the primary, essential, and determining cause of labor.

Dr. Bedford, of New York, has also ventured an hypothesis as to the natural cause of labor. He contends that, as the muscular fibres of the uterus had developed during pregnancy, owing to increased nutrition, they continually acquire more contractile power, and toward the ninth month are "surcharged with contractility," whence follows a series of acts which constitute labor. It may be objected that there is no evidence of an increase of contractility proportionate to the growth of the uterine fibres. We have known the uterus to contract very powerfully; and with intense suffering, even in the unimpregnated state. In cases of abortion, the contractions are often apparently as powerful as at the full period of utero-gestation. Moreover, it is well known that the contraction of the uterine fibres is, *ceteris paribus*, inversely as the size of the uterus. Hence, when the uterus is large, as in compound pregnancy, or where there is a large quantity of liquor amnii, the contractions are feeble, notwithstanding the great development of the muscular fibres of the uterus; but, on the contrary, when the waters are discharged, and the uterus, therefore,

smaller, the contractions become more and more vehement, until the foetus be expelled. We can see no evidence, therefore, of the increased contractility supposed to be so cumulative as to necessitate labor at a given period. Moreover, it is altogether inconsistent with the fact that labor occurs frequently at the ninth month after fecundation, when the child has been for months dead in utero, and where there is, of course, no further development of the fibres, and certainly no increase of irritability. In cases, also, of extra-uterine pregnancy, where there is very little development of the uterus, efforts of labor are observed at the ninth month.

If it should be acknowledged that there is a surcharge of contractility at the full period of utero-gestation, why should contraction take place at that time? Contractility, or the capability of contracting, is a passive state; it requires some agent to excite contraction. A Leyden-jar may be surcharged with electricity, but it is quiescent until a rod or some other agent be presented for its discharge.

All attempts, therefore, to discover the natural determining or exciting cause of labor, have signally failed. It is an ultimate fact, that at the end of the tenth lunar month after fecundation, labor in the human female will occur. It is a generic law.

The Accidental Causes of Labor.—These are innumerable, and require the constant study and attention of the practitioner to prevent premature delivery through their influences. They include everything that can make a positive impression upon the uterine tissues. As these tissues are more or less susceptible in different women, labor may be excited in many instances where there is great excitability or irritability of the uterus, by a trifling cause, while in other instances gestation will continue when powerful disturbing influences exist.

Mental and moral emotions, or the various sentiments, feelings, and passions of the individual, acting as they do through the medium of the brain and nervous system, are among the common accidental causes of labor.

Mechanical causes, such as falls, blows, contusions, violent straining efforts, and sudden or violent motions, may also excite uterine contractions.

Various sympathetic influences, not only from the brain and spinal marrow, but from the stomach, the small and especially the large intestines, as well as other organs of the body, often disturb the uterus, and may prematurely excite labor.

Certain pathological states, such as colitis, enteritis, gastritis, and other inflammatory affections; especially, also, general febrile disturbances, such as the varieties

of idiopathic and symptomatic fevers, may be classed as accidental causes of labor.

POWERS OR FORCES.—The essential powers by which labor is effected, are often termed the proximate causes of labor. They are, first, uterine contractions, and, second, contractions of the muscular parietes of the abdomen. The former are essential, and the latter secondary or accessory.

Uterine Contractions.—These are the primary essential forces, without which labor cannot be accomplished. Petit seems to have been among the first who positively demonstrated the contraction of the uterine fibres in parturition. It is, however, so apparent, that it is strange that any doubt could have been maintained upon the subject. It is proved by the hardness and rigidity of the uterus and the alteration of form perceptible through the parietes of the abdomen when labor has commenced; by the sensations of twisting, grinding, and contraction perceptible to the mother; by the rigidity and alteration of size in the os uteri; by the tension and protrusion of the membranes; by the descent of the child; by the pressure to which the hand of the practitioner is exposed when introduced into the uterus, as well as by the hardness and rigidity of its internal surface; and by the rapid diminution and obliteration of its cavity after its contents have been evacuated. All these and analogous facts prove the contractility of the uterus. Modern anatomists and physiologists leave no room for doubt that this power of contractility resides in the muscular fibres of the organ, which indeed must be regarded as a hollow muscle.

The *modus operandi* of this power, although essentially the same at all times, must be regarded in different points of view, according to the effects produced.

In some instances there is a general and uniform contraction of the muscular tissue, by which the walls of the uterus are condensed, thinned, and rendered more firm and rigid, so as to compress slightly its contents. This is termed *the tonic rigidity or contraction* of the uterus; the effect of which is to diminish the quantity of the circulating fluids by lessening the size of the arteries and veins, and also to diminish the cavity of the uterus so as to accommodate it to its contents. Thus, when the liquor amnii is evacuated, the size of the uterus is lessened, and it is brought into close contact with the body of the child: when the child is expelled, the placenta is compressed; and when this body is discharged, and no coagula present, the cavity is obliterated, and its anterior and posterior surfaces brought into contact by the same regular tonic contraction. The tissues of the uterus are not thrown into

folds, but become regularly condensed as they diminish in size, maintaining the proper regular form of the organ.

These tonic contractions of the uterus do not cause sensation; the patient is not conscious of them, as no pain or other symptom of distress is excited. They, however, are very important, not only in maintaining the relative size of the uterus, required by its contents, but in diminishing the congestions of the blood-vessels during labor, and preventing severe hemorrhages or floodings after the separation of the placenta.

These “insensible contractions” of the muscular fibres of the uterus are analogous to those of the heart, bladder, intestines, etc. They have, hence, by some authors, been termed “peristaltic.” This, however, does not, we think, convey a correct idea. The contractions of the uterus are not in regular succession, like those of the stomach and bowels, or those of a worm; but they are regular and simultaneous, like those of the ventricles of the heart, or the muscular coat of the bladder. They, therefore, expel the contents of the uterus by a general, equable action, precisely as the blood is forced out of the ventricles, or the urine from the bladder. The analogy with other hollow muscles is confirmed, not merely by the absence of sensation, or consciousness on the part of the individual, but also by the fact that such contractions are altogether involuntary: the will of the patient cannot excite, arrest, or even retard the action by any direct effort. Labor is, therefore, an involuntary function.

This tonic contraction of the uterus is considered by anatomists and physiologists as dependent entirely on the ganglionic or sympathetic system of nerves, and to be independent of the cerebro-spinal system. This idea is confirmed not merely by the absence of sensation and the involuntary character of the action, but by the fact that children, in some instances, have been born after the death of the parent, when, of course, all motor influence from the spinal marrow had ceased. Women have also delivered themselves when suffering from paraplegia. M. Brown Sequard has enumerated many instances in which he has known labor to be completed, during experiments upon animals, after the entire destruction of the spinal marrow. He also affirms that he has seen the uterus contract after its entire removal from the body. All these facts confirm the idea of an inherent power of contraction on the part of the uterus analogous to what is known to exist in the heart.

It is difficult, if not impossible, to estimate the degree of this power, and, of course, the extent of its influence upon the whole process of delivery. Certainly, however, this inherent contraction is primary,

essential, and independent of the cerebro-spinal system, although, as we shall presently see, receiving powerful aid from the great centres of excito-motor action.

Respecting the delivery of children after the death of the mother by the insensible contractions of the uterus, reference is made merely to those cases where the child is born in the course of a few minutes or a few hours. When delivery does not occur for several days, it doubtless arises not from any remaining uterine contractions, but, as M. Velpeau observes, from the disengagement of gas in the abdominal cavity, by which so much pressure is made on the uterus, that its contents may be expelled, provided there had been any previous dilatation of the os uteri before the death of the parent.

When, however, labor has fully commenced, the muscular fibres of the uterus take on a more decided action; they begin to contract more powerfully for a time, and then this action is suspended. These alternate contractions and relaxations are at first trifling and at long intervals; but, as labor advances, the contractions become more persistent and vigorous, and the intervals of shorter duration. These alternate contractions are the most efficient agents by which labor is continued and finally completed.

Various designations are given to them, according to the circumstances which attend their action, or the effects produced. Hence, we speak of *alternate*, *spasmodic*, *convulsive*, or *paroxysmal* contractions of the uterus. They are said to "go and come," to be intermittent. As by them the os uteri is dilated, they are called dilating contractions; and as by them the child is forced downward, they are called the expulsive, bearing-down, forcing, or straining actions of the organ. Moreover, as more or less suffering has been induced, amounting sometimes even to agony, these contractions are usually designated by the word "pain;" hence, pains of labor are synonymous, in common parlance, with the contractions of the uterus, and are generally proportionate to the degree of contraction—the greater the pain, the more violent the effort. This declaration, however, must be received with many restrictions; for frequently the whole first stage of labor is accomplished without pain, and with even trifling sensations; indeed, in the second stage—that of expulsion—the contractions may be very efficient, and the suffering very moderate. Indeed, in one case a lady insisted she had *no pain*. The practitioner, therefore, cannot always trust to the sensations of his patient, either as to the occurrence or progress of labor, by the degree of pain existing, and he cannot always be satisfied that there is no labor because there is no pain; his investigations must be more minute and extensive.

The *kind* of pain, or the peculiar sensation excited,

varies during the different stages of labor. In the first stage, that of dilatation, the pains are represented as being grinding, twisting, cutting. During the second stage they are termed weighty, pressing, bearing-down, forcing, or expulsive. Women are conscious, in some instances, that the pains are not regular or natural; they are suddenly seized with a species of neuralgia or spasmodic pain, which agitates or causes them to exclaim that "the pains do no good," or that they are in an unnatural location. This fact may often be confirmed by the practitioner.

These alternate contractions of the uterus are entirely involuntary; the will of the patient has no effect in exciting or arresting these actions; hence, the process of parturition is beyond the dominion of the "will." Nevertheless, as muscular contraction and pain depend upon the cerebro-spinal system, the uterine functions are very much under its control, and, of course, under the influence of the mind of the patient, of her intellectual and moral states. All accoucheurs are familiar with proofs of this assertion. Mental and moral causes often induce, retard, or hasten this process. The presence of a physician, or of a stranger in the lying-in room, diminishes uterine actions; the patient says, "her pains are frightened away." Anxiety arising from the absence of her professional attendant, or from any other cause, often aggravates the pains, which again diminish when the cause of anxiety has been removed. Indeed, the domain of the nervous system over uterine actions is so great as to be universally acknowledged, and rendering it all important, during the continuance of pregnancy and labor, to regulate the mind and feelings of the patient, as well as her whole corporeal system.

The *seat*, or location of uterine pain during labor, has been a subject of discussion. Madame Boivin, who ought to be a correct judge, having suffered in *propriâ personâ*, locates the pain about the cervix uteri; nevertheless, from the representations of patients, from the sensibility of the uterus in all parts of its structure, from the sensations of grinding and cutting across the hypogastrium and also frequently toward the fundus of the uterus, and from the extreme sensibility of the internal surface of the uterus and the violent pain excited throughout the whole organ, when the hand of the practitioner is introduced into its cavity,—from these, and similar facts, we infer positively that pain is experienced in every portion of the uterus during labor. This is confirmed by the positive evidence of suffering often manifested in cases of irritable and inflamed uterus, and is also supported, by analogy, with other muscular tissues, as of the stomach, bowels, bladder, etc., in a state of morbid excitement.

There seems no reason for the supposition that the fibres of the body of the uterus may contract without pain, while those of the cervix should, during their action, be productive of such agonizing suffering, even if we admit that there is naturally more sensibility about the os and cervix uteri than in the body and fundus.

The *cause* why contractions of the uterus should be painful is enveloped in obscurity. It seems difficult to imagine why the physiological action of this organ should be attended by suffering, when no other similar example can be presented in any other muscular tissue of the male or female, in their healthy conditions. Speculations have been advanced upon this subject, but they are altogether unsatisfactory. We must again refer it to the original law of the animal economy, impressed upon it at its creation, or take the declaration of Revelation that "in sorrow shalt thou bring forth children."

When speaking of the tonic contractions of the uterus, their analogy to those of the heart and other hollow viscera was noticed, and their great independence of the cerebro-spinal system of nerves. These alternate contractions, however, are evidently dependent on this system, inasmuch as violent pain is experienced, and the mental and moral emotions are disturbed, sometimes increasing, and sometimes diminishing the uterine efforts; and also, inasmuch, as when such irritations of the brain and spinal marrow exist, then by a reflex influence powerful contractions of the abdominal, and indeed of all the voluntary muscles, are excited during labor, and not unfrequently, in severe cases, violent cramps and convulsions are induced. It is needless to present facts, either of a physiological or pathological character, to demonstrate that, while the uterus has, to a limited extent, a *quasi* independence of the nervous system, yet that there is the most intimate relation between it and other tissues and organs of the economy. Hence, there is a constant mutual action and reaction between it and the brain, spinal marrow, and their dependencies—any change in the condition of the uterus affecting the brain and its dependencies, and any disturbance of these organs almost instantaneously exciting or altering the uterine sensibilities. Anatomy explains these facts; the nerves of the uterus, although intimately involved with the ganglionic system, are directly or indirectly connected with those of the spinal column. This is said to be especially the case with the nerves of the cervix uteri, thus accounting for the greater sensibility of this portion of the uterus, and for many of its peculiar actions.

It may be stated, therefore, that, although the first contractions of the uterus are independent, yet that

such contractions, sooner or later, disturb the sensitive and motor nerves of the spinal marrow and brain, so as speedily to enhance uterine contractions, and excite those sufferings and pains so characteristic of the parturient process.

This intimate connection of the uterus with the cerebro-spinal system distinguishes it from the heart and other viscera, whose organic actions, although somewhat under the influence of the nerves of animal life, are far more independent.

One effect of these uterine pains or contractions, at the commencement of labor, is the *dilatation of the os uteri*. At the termination of utero-gestation the os uteri is closed, and the lower part of the cervix is occupied with a thick gelatinous deposit. In other instances, no deposit can be observed, and the membranes are in close contact with the edges of the os, and sometimes they can be readily felt by making a slight pressure on the orifice. As soon as regular contractions commence, all portions of the uterus become hard and rigid. This rigidity is very perceptible in the cervix on examination per vaginam, thus indicating powerful action of all the fibres longitudinal, spiral, or circular at the inferior section of the uterus. The finger upon the orifice perceives not only the increasing rigidity of the tissues, but also their condensation—the edges of the os becoming thinner, and the opening slightly enlarging. As soon as the contraction subsides, the tissues become soft and relaxed, and the mouth yields more readily to the presence of the finger. Every subsequent contraction, although manifested by an increased density of the tissue, gradually separates the edges of the os, so that when relaxation occurs, the opening is still more perceptible, and the membranes are approximated toward the vaginal surface. As labor progresses, the os is thus enlarged, with more or less rapidity, by these alternate contractions of the uterus; until, after the lapse of ten or twelve hours, it is fully dilated—that is, usually to the extent of three or three and a half inches in diameter. The membranes present at the os a still larger segment, proportionate to the dilatation of the orifice.

The rapidity of this dilatation varies at different steps of its progress; at first, it is exceedingly slow, and almost imperceptible, but after the diameter is augmented to one and a half or two inches, the subsequent dilatation is far more rapid, especially when the membranes remain unbroken. The rapidity is far greater in women who have borne children, and is accompanied with less suffering than in the primiparous, where this process is, comparatively, very painful and tedious, and continues not only for ten or twelve, but for twenty or twenty-four hours, and occasionally even

for days. It also depends upon various temperaments and constitutions of women, as well as upon accidental states of nervous or vascular excitement and congestion.

It is difficult even for the experienced practitioner to judge, by examinations, of the time to be occupied by this process. As a general rule, when the edges of the orifice are very thin and hard, the dilatation will be slow, especially if considerable density remains after the contraction has subsided. When the edges are thicker and softer, the orifice enlarges more rapidly. Occasionally, however, when they are quite thick and dense, and especially if the cervix has not been fully developed, so that the membranes are still high, more tediousness may be expected, as is often remarked in premature labors. After the os uteri is partially dilated, the subsequent dilatation is often very rapid, even if the first part of the process had been unusually slow. Should the liquor amnii have escaped prematurely, there is often an arrest of the process, or, at least, a great retardation: a kind of spasmodic contraction of the os, occasionally recurring, delays even for hours the progress of the presenting part of the child. The edges are so firm and rounded, in such cases, that practitioners have compared their resistance to that of a strong cord; hence we hear of the "whip-cord" condition of the os uteri.

That the dilatation of the os uteri is truly a *vital process*, depending upon the contractions of the muscular fibres of the uterus, seems indisputable. It is evinced by all the phenomena that have just been detailed, and by the fact that rigidity, or indisposition to dilate, is augmented by increased nervous or vascular excitements and congestions, and by all those sympathetic disturbances which have a tendency to augment the excitements of the cervix uteri. On the contrary, everything which diminishes nervous excitements and vascular congestions—such as bleeding, and other evacuating treatment, the use of opium, ether, and all sedatives—facilitates dilatation. So, also, an abundant secretion from the neck and orifice of the uterus, from the vagina and subjacent tissues,—whether occurring naturally, as is usual with healthy women at the commencement of labor, or artificially induced by medical measures, especially such as warm bathing, poultices, rectal and vaginal enemata of warm mucilaginous fluids, etc.,—greatly favors the relaxation and dilatation of the os uteri and moderates the sufferings of the patient.

The *modus operandi* of the muscular fibres in effecting the dilatation of the os uteri appears to be very evident, although the details of their operation cannot be fully specified. We do, however, know that by

means of the circular, longitudinal, and spiral fibres of the uterus, the whole organ can be condensed and contracted so as to accommodate itself to its contents, and finally to obliterate its cavity. Hence, we may infer a universal action of these fibres, having a tendency to diminish its size in every direction. This tendency cannot be efficient in the antero-posterior and lateral directions, so long as the uterus is occupied with an incompressible body. This, however, is not true as regards the length of the uterus, inasmuch as at the lower extremity of its long axis there is a natural opening, and as the tendency of the uterine fibres is to diminish its length, the fundus will be drawn toward the os, and the os toward the fundus. The fundus cannot, of course, yield; but the inferior portion, where the opening exists, may yield in proportion to the power of the contraction relatively to the resistance of the edges of the os. If these yield readily, it is manifest that they must be drawn asunder; and as these fibres operate on every minute portion of the circumference of the opening, the whole circle is enlarged. As this dilatation continues, under the influence of powerful contractions of what may be termed the longitudinal fibres of the uterus, the edges of the os uteri are drawn over the membranes of the ovum, as upon a mould, and eventually when the dilatation is greater, they ascend upon these membranes nearer to the fundus; in other words, the length of the uterus is shortened, there is a descent of the fundus, and an elevation of the os uteri. It is manifest, however, that the whole of this process must be resisted by the tonicity and contraction of the circular fibres of the cervix. Hence, the dilatation is tedious, in proportion to the tonicity and contraction of the circular fibres, as is evinced in first labors especially, and in all cases of nervous irritation of the cervix. As, however, the action of the longitudinal fibres is evidently more powerful than that of the circular, these yield; so that the os becomes dilated. This occurs more rapidly in proportion as the process continues, inasmuch as the longitudinal fibres continually increase in efficiency as labor advances, and their length is decreased; while that of the circular fibres diminishes as their length increases in proportion to the enlargement of the cervix and os, by the presenting part of the child. Hence, we speak of the relaxation of the circular fibres of the uterus as labor continues: but this must be used in a comparative sense; for, strictly, there is no relaxation, as the circular fibres are continually acting during the contractions of the uterus, but make less and less resistance to the increasing energy of the longitudinal fibres; and it is a fact confirmed by experience, that within certain restrictions the force of

uterine contractions are inversely as the length of the fibres—the smaller the uterus, the more powerful its efforts. Upon this principle, when the neck of the uterus is small, it resists dilatation more effectually than when it is enlarged, and, of course, its fibres are elongated. These fibres, therefore, are only comparatively relaxed; that is, they afford less resistance as labor advances.

The dilatation of the os uteri, therefore, is essentially a vital process, the muscular contraction being the efficient agent by which it is accomplished. This dilatation of the os uteri essentially differs from the dilatation of the orifices of the rectum and bladder; these last are under the dominion of the will, the former is involuntary. The contractions of the longitudinal fibres of the uterus gradually overcome the resistance of the sphincters of the uterus; but the contractions of the fibres of the bladder and the rectum increase the contraction of their sphincters; until such contractions are so uncomfortable or painful, that they become suddenly relaxed by volition.

Many authors, however, speak of the dilatation of the os as being more of a mechanical character; they represent it as being effected by the pressure upon the ovum mechanically distending the neck and orifice of the uterus, but they acknowledge that this pressure upon the ovum is caused by the contractions of the body and fundus of the uterus.

Several considerations confirm the idea that the dilatation is active, not passive; that it is vital, not mechanical. Many of these have already been detailed in speaking of the *modus operandi* of the longitudinal and circular fibres of the uterus and their antagonism. In addition, it may be observed that the density and contractility of the cervix are far too great to be overcome by the delicate membranes of the ovum, which we know will readily rupture, even under moderate pressure. In examinations, also, per vaginam, we find that as soon as the pains diminish, these membranes become soft and relaxed; that the os dilates to a considerable extent before the membranes are pressed within its circumference; and that when the membranes are ruptured, dilatation will continue, even if the presenting part of the child is not engaged within the orifice. We find, also, that the os uteri dilates more rapidly when the soft, distensible membranes of the ovum present, than when the hard, resisting head of the fœtus occupies the cervix. All this is confirmed by the efficiency of those measures calculated to diminish vital excitement at the neck and orifice of the uterus in promoting dilatation.

It may be remarked, also, that during labor, any effort to dilate the os uteri by the finger or by the hand

is exceedingly difficult; the contraction of the os often becoming more vehement in consequence of the force employed. Thus, in some instances, as Dr. Dewees observes, the edges of the os may be ruptured before its fibres will yield to the force of dilatation.

Although, therefore, the enlargement of the os uteri is essentially active, and the ovum or presenting part of the child may be regarded chiefly as a "mould," upon which the cervix expands; yet we would not deny that some moderate dilating influence is exercised by the ovum, especially after the os uteri is partially dilated, and the membranes protrude through the opening. When these are strong, and rendered very tense by the contractions of the body of the uterus, they not only keep the os and cervix dilated, but may have some influence in facilitating the dilatation. Moreover, after rupture of the membranes, the presenting part of the child, when it is engaged in the orifice, keeps it distended, and acts also in some degree upon the principle of a wedge; it is more powerful than the membranes, as it is more resisting, and the contractions of the uterus are now more vigorous.

During the process of dilatation, if the ovum remain perfect, it will be found that the membranes are soon pressed within the circle of the os uteri, and as the process advances they protrude through the orifice to a greater or less extent, proportionate to the dilatation of the os, the strength of the membranes, and the liquor amnii present. This protrusion of the membranes into the vagina is the *second* effect of the uterine contractions, and is technically called *the bag of waters*. This swelling is sometimes very slight, even when the os uteri is fully dilated; but sometimes it is very large, projecting into the vagina even to the bottom of the pelvis, and occasionally not only reaching the orifice of the vagina, but actually appearing externally. The relative size of the protrusion depends chiefly on the density or strength of the membranes; but also on the quantity of the liquor amnii present; when this is abundant, it descends under the presenting part of the child, and if the membranes be strong, may distend them to the degree just mentioned.

The formation of this bag of waters in the vagina is owing to two causes,—first, the diminution of the cavity of the uterus and the ascension of the edges of the os uteri upon the ovum, in the manner already explained. The second cause is the distensibility of the ovum—that part which is within the cavity of the uterus, being supported by its walls, cannot enlarge; but that portion at the orifice which protrudes into the vagina, having little or no support, must be distended by the great pressure induced by the uterine contractions.

The size, therefore, of the bag of waters is not sim-

ply in proportion to the magnitude of that part of the ovum which has escaped from the uterus, but also to the distension which occurs after its descent. It varies exceedingly; in many instances there is no bag, owing to the premature rupture of the membranes, or the great deficiency of the liquor amnii. Indeed, in most instances, the bag is not very large, as rupture occurs soon after the os is dilated, so that the protrusion extends but one or two inches below the presenting part of the child. The size and form of the bag is said also to be large and hemispherical in presentations of the vertex, smaller in those of the breech, and still smaller and more cylindrical in cases of presentation of the feet. It may be more simply stated, however, that the size is dependent upon the degree of dilatation of the os uteri before the membranes are ruptured, and hence it is occasionally large even in pelvic presentations.

The *third* effect, induced by the powerful contractions of the uterus, is the laceration of the ovum, and the escape, partial or complete, of the liquor amnii: it is commonly called *the rupture of the bag of waters*. It has already been intimated that this rupture may occur before labor, or at any time after its symptoms have appeared; most frequently, and, we may say, most naturally, it takes place when the process of dilatation is complete, and the bearing-down efforts of the uterus occur. In other instances, it does not take place till the membranes protrude at the vulva, and, in some very few instances, it is said that the whole ovum, of course including the placenta, has been protruded, without any rupture of the bag. The author met with one case of this kind at the sixth month of utero-gestation. It is reported as having occurred even at the ninth.

The cause of the rupture is very evident: it arises from the powerful contractions of the uterus, compressing the ovum, causing the protrusion, distension, and, of course, the laceration of that portion which is unsupported by the vagina; and from the natural delicacy of these tissues, and the diminution of their thickness and strength, by the process of distension, so disproportionate to the powerful expulsive efforts of the uterus.

The point of rupture, when the bag is small, and especially when the rupture occurs early, is usually toward the centre of the os uteri at the most convex part of the "bag." If, however, the os uteri be so fully dilated that the vertex is already engaged, the opening will be found nearer to its anterior edge, where the distension is greatest. In the few cases where the bag is so large as to occupy the cavity of the pelvis, the rupture will be found upon the anterior portion of its circumference, directly opposite the os vaginæ, for at this spot the membranes will have no support, while

every other portion is, at least partially, supported by the walls of the vagina and pelvis.

In a few rare instances, the membranes spontaneously rupture some distance above the os uteri, causing a partial discharge of the liquor amnii. The openings thus made may be closed afterward by the pressure of the child against the walls of the uterus. In such cases the bag of waters, although diminished, will not disappear, until a second rupture is effected. As soon as the rupture occurs, the bag immediately collapses, attended by a rush of the liquor amnii, proportionate to the size of the bag, and followed by the tonic contractions of the uterus, so that its walls are brought in contact with the body of the child, and the size of the whole organ immediately lessened in proportion to the quantity of fluid evacuated. This is generally to the great relief of the patient. As further and more powerful contractions of the uterus ensue, the waters continue to be evacuated at intervals. Sometimes, however, especially in head presentations, portions are retained, the head operating as a valve; generally before the end of labor the whole has been evacuated, although, occasionally, the exit of the child is followed by another gush of liquor amnii.

The *fourth* effect of the expulsive efforts of the uterus is the *descent and delivery of the fœtus*. This is accomplished, so far as the uterus is concerned, by a continuation and increase of the contractions of the longitudinal and circular fibres of the uterus, by which its cavity is diminished in every direction, and the child greatly compressed, and, of course, expelled through the only opening which exists at its inferior extremity, which, if the labor be regular, has been already sufficiently dilated for its exit. Here, also, there can be little diminution, comparatively, in the lateral or antero-posterior diameters of the uterus, so long as any portion of the child remains within its cavity; but there is a great diminution in the long axis of the uterus—the fundus being continually drawn down, and the edges of the os uteri drawn up, in proportion as the child passes through the orifice of the uterus into the vagina. Hence, during this stage of labor the edges of the os uteri gradually recede as the head advances, till very soon they cannot be reached by the finger of the practitioner; the child thus escapes from the uterus, not merely by the force from above, causing the descent of the fundus, but also by the ascent of the os uteri over the head, shoulders, and body of the child. Moreover, as there are many resistances, especially in primiparous labors, to the descent of the child, it is found that the contractions of the uterus become proportionally more prolonged and vigorous. Hence, the os uteri is continually drawn up

on the body of the child, while the fundus is depressed, and the cavity of the uterus is diminished.

Hence, as the vagina is attached to the extremity of the cervix, it is manifest that its tissues will, to some extent, resist the ascent of the os uteri; these vaginal tissues, however, yield in the most remarkable manner, ascending over the body of the fœtus, just in proportion to the ascension of the os uteri. At the same time the lower extremity of the vagina is pushed downward, through the inferior strait, by the presenting part of the child, forming the perineal tumor, so that the orifice of the vagina is advanced in front of the symphysis pubis. Hence, the canal of the vagina, in addition to its great lateral distension, is elongated to a great extent, by the ascent of its uterine extremity, and the descent of its perineal portion. Indeed, in common cases of labor, this tube becomes so distended and elongated as to occupy the whole cavity of the pelvis, even when enlarged by the distended perineum. There is reason to believe that so great is the distensibility and strength of the vaginal canal, that in tedious labors, where the head is long delayed upon the perineum, a large portion of the body of the child, as well as the head, may be received into this elongated tube. Is it not, indeed, possible that the whole fœtus has been extruded from the uterus, and contained in the vagina between its external orifice and that of the os uteri, especially in tedious labors, extending for four or five days? Whether this be true or not, certain it is that the distension of the vagina is sometimes enormous.

After protracted labor the os uteri is very frequently found as high as the superior strait, even when the placenta has been removed; in some instances, especially where the placenta has partially protruded through the orifice, it is still more elevated. The author has met with a case of dystocia, arising from rigidity, and the presence of twins, where, after delivery of the children, the double placenta was found in the right iliac fossa.

There can be no doubt that continued contractions of the uterus, in cases of impracticable labor, where the fœtus cannot escape, by thus drawing up the edge of the os uteri, and elongating the vagina, may and do cause a rupture of the vagina, with its terrible consequences. There is reason to believe that ruptures of the vagina are more frequent than those of the uterus, and that they generally result from distension and elevation of its tissues beyond their capability of endurance.

The question has been agitated, why the contractions of the uterus become more and more powerful after the head first enters the os uteri until its com-

plete extrusion from the vagina. We feel perfectly satisfied in referring it, as we have done as respects the determining cause of labor, to a fundamental law of the animal economy. It is an original fact or principle, that the contractions of the uterus are inversely as the size of the organ. The more the longitudinal and circular fibres are shortened, the more efficient is their action. Hence, when the membranes are ruptured, and the liquor amnii evacuated, the pains become more severe and prolonged; and hence, also, there is a still greater increase of severity, as the child descends and the uterus decreases in size. And, finally, the most severe contractions are experienced at the termination of labor, when the last portions of the infant escape from the uterus.

In perfect consistency with this fundamental law, it may be conceded that such powerful contractions are to some degree aggravated by pressure upon those sensitive tissues which exist at the os uteri, in the cavity of the pelvis, and at the outlet of the body. There can be no doubt that the sufferings of the patient are exceedingly augmented by the firm pressure often made upon the perineum, upon the sacral and sacro-sciatic nerves, as well as upon the orifice of the uterus; thus sympathetically increasing the muscular powers of the uterus through the medium of the sensitive and motor nerves of the cerebro-spinal system, so abundantly distributed to the tissues of the pelvis. We cannot, however, subscribe to the notion that such pressure on these tissues is the original or efficient cause of uterine contractions. These last are primary, essential, and, in a limited sense, independent; while the pressure on the pelvic tissues is an accessory or aggravating cause.

The *fifth* effect resulting from the powerful efforts of the uterus, is the *detachment of the placenta and membranes* from the internal surface of the organ, and their expulsion from its cavity. The *modus operandi* of the fibres in separating the placenta appears very clear. This body is a soft, flat mass, some six or eight inches in diameter, with very slight attachments to the internal surface of the uterus by the remains of the membrana decidua. It has, also, no contractile power; hence, during the contractions of the uterus, that portion of its internal surface directly opposed to the placenta must, as the child escapes, diminish exceedingly in size, so that eventually, when the child is born, it will be reduced from six or eight to three or four inches in diameter. Necessarily, therefore, the slight adhesions of the placenta are ruptured, and this body is, as it were, pressed off from its former attachments, and all its peculiar functions destroyed. It would be interesting and useful to determine at what period of labor a per-

fect separation of the placenta takes place. It is probable, however, that it seldom occurs prior to the escape of the foetal head from the vagina; inasmuch as the child is often born alive when the uterus has been greatly contracted, in tedious and protracted labor. Perhaps in most cases the placenta is found detached, on examination, after the birth of the child.

The "after-birth," being thus separated, acts as a foreign body, and soon excites the uterine contractions, so that by them it is brought to the orifice of the uterus, and eventually thrown into the vagina. At this time the contractions usually cease, and, so far as the uterus is concerned, labor is finished.

Nevertheless, in many instances, a *sixth* effect results from uterine contractions. During the condensation of the uterus, and the consequent separation of the placenta, the necessary exposure of the open, patulous orifices of the uterine veins or sinuses, must be greatly diminished, and frequently nearly closed by these uterine contractions, arresting the tendency to venous hemorrhage or flooding. It, however, generally occurs that blood, in small quantities at least, escapes after the separation of the placenta. This blood, whether in large or small quantities, is often partially retained by the placenta, situated at the orifice of the uterus, or in the vagina; being at rest, it soon coagulates, and hence, after the expulsion of the placenta, coagula of a larger or smaller size may be retained in the uterine cavity. These may become a source of irritation; maintaining the contractions of the uterus with more or less regularity, until they also are expelled, and the uterus becomes completely emptied.

Sometimes, owing to the subsequent relaxations of the uterine tissues, more blood escapes from the venous sinuses, and other coagula will be expelled in like manner; indeed, very universally, for some days after delivery, there is more or less effusion of blood, from the imperfect closure of the venous orifices. It, however, passes off rapidly, and being mixed with serum and mucus, seldom appears in clots, and is known under the denomination of the "*lochiæ*," which seldom disappear until two or three weeks after labor.

Such are the powers exercised by the uterus during parturition; and all of them are dependent upon the contraction of its muscular fibres. They are at first insensible, uniform, and more or less permanent, constituting the tonic contractions of the organ, by which it is accommodated to its contents. The second series of contractions are alternate, spasmodic, or paroxysmal, and constitute the efficient action by which the os uteri is dilated, the bag of waters is formed and ruptured, and by which also the child and placenta are expelled. Such contractions are usually sensible; that

is, the patient is conscious of their presence by various sensations, more or less distressing, and generally by positive pain. Often, however, the whole process of the dilatation of the os uteri is accomplished without pain, and, in a few rare instances, the expulsion of the child. Generally, the pain is in proportion to the degree of contraction; nevertheless, from peculiar local sensitiveness, or from great susceptibility of the nervous system, some women suffer excessively from moderate contractions, and, in some, the pains become actually intolerable—hysteria, delirium, convulsions, and even coma supervening.

It has been debated whether these contractions of the uterus are alone sufficient to perform the whole process of labor. A negative answer might be safely given to this question, inasmuch as other agencies of a very different character have been provided for accelerating the process, and aiding its completion.

Nevertheless, it is possible, and no doubt it has occasionally occurred, that the child is expelled simply by uterine action. We all know that by this alone the os uteri is dilated, and the membranes ruptured; in many instances it has also been observed that the child has been expelled suddenly and unexpectedly, without any apparent effort on the part of the mother, and often when she is in convulsions, in a state of stupor, or where there is paraplegia; in all of which cases the contractions of the abdominal parietes have been very feeble, if not entirely suspended. And, finally, the most positive proof is, that where the mother has perished, if the os uteri be dilated, the child has, in some few instances, been expelled; and in such cases, of course, all action of the abdominal muscles had entirely ceased. These, however, are exceptionable cases; the general principle or law is, that contractions of the uterus are essential for the dilatation of the os uteri, but are not adequate alone for the expulsion of the child; they must be assisted by another agency.

Contractions of Abdominal Muscles and Diaphragm.—It has been already mentioned that the efforts of the uterus in expelling the child and its appendages are assisted by the contractions of the muscular walls of the abdomen, as constituted by the diaphragm and abdominal muscles. These are called the *accessory powers*. These muscles differ from those of the uterus, in being under the command of the will of the patient, so that their influence can be increased or diminished, by the mind of the patient. By the conjoined action of these muscles, the viscera of the abdomen can be compressed; and also a particular direction can be given to this compressing force upward or downward, according to the exigencies of the case, or the pleasure of the individual. Hence, in the act

of sneezing, coughing, vomiting, the whole of this power of the abdominal muscles can be directed from below upward for the expulsion of offensive matters from the nose, lungs, and stomach. Hence, also, this power may be directed from above downward, to facilitate the expulsion of the contents of the rectum, the bladder, or uterus; in which case the diaphragm and the upper portions of the abdominal muscles contract forcibly, while the inferior portions contract with less vigor. This is exemplified very decidedly in the natural act of defecation, and still more powerfully in cases of severe rectal irritations, as in rectitis, colitis, etc. The same disposition to strain or force downward is experienced by females in various cases of vaginal and uterine irritations, even in the unimpregnated state. But it is during labor that the sensations of pressure and weight become so intolerable that the most violent bearing-down sensations are manifested, greatly assisting, and generally essential to the completion of the parturient process.

The *modus operandi* of these contractions of the abdominal muscles and diaphragm is easily explained. Let it be observed, however, that in regular labor, when the child is high up, and before the os uteri is dilated, there is not much disposition to strain, and, indeed, ought not to be, as the os uteri not being dilated, the child cannot escape, and therefore nothing can be gained by the exercise of this accessory power. The contractions of the abdominal muscles can, of course, have no effect in dilating the os uteri, but may, on the contrary, delay it by increasing nervous excitement, and the rigidity of the cervix uteri. When the orifice of the uterus is fully dilated, and the bag of waters formed, and therefore the first stage of labor completed, the sense of fulness, the weight and pressure in the pelvic region, and the disposition to strain become so powerful as hardly to be resisted; indeed, it ought now to be indulged. The first effect, therefore, of this bearing-down effort is to facilitate the rupture of the membranes. This is often done, simply by the contractions of the uterus; but where the whole organ, and, of course, the ovum, receives an additional pressure from above, the membranes are rendered more tense, and their disposition to yield augmented. Hence, it is found that a rupture of the bag of waters generally occurs during the bearing-down efforts of the mother.

The next effect of the abdominal muscles is to increase the tonic contractions of the uterus, so that the waters being evacuated, the parietes of the uterus are brought into close contact with the body of the child, increasing, at the same time, its flexion.

Another effect of this compression is to stimulate the uterus, and increase its contractions, by fixing and sup-

porting this organ, and making an equable pressure over its whole peritoneal surface. This pressure by the abdominal muscles gives also a proper direction to the axis of the uterus, during labor; for the stomach, liver, spleen and intestines situated above and behind the uterus are forced by the action of the diaphragm and abdominal muscles against the posterior surface of this organ. Hence, the fundus is pushed more and more forward toward the umbilicus and linea alba, and when the size of the uterus is diminished by the escape of the liquor amnii, its axis, by this agency, will be found approximating the axis of the superior strait of the pelvis. The great advantage and importance of this circumstance in facilitating the descent of the child will be hereafter explained.

This accessory power greatly facilitates also the direct expulsion of the child. The uterus being fixed by its attachments and pressure against the brim of the pelvis, cannot descend any lower. Hence, all the compressions made upon the superior portions of the uterus must act through the medium of its walls directly upon the child, and thus force it downward through the pelvis to complete delivery. They facilitate, at the same time, the distension and elongation of the perineum, and also the enlargement of the os vaginæ, so as to allow the escape of the child.

The child being born, the contractions of the abdominal muscles continue to facilitate the tonic and also the alternate contractions of the uterus, which effect the detachment and expulsion of the placenta from the cavity of the uterus, and also any coagula that may be present.

Finally, it is solely by the bearing-down efforts that the placenta is protruded through the vagina to complete deliverance. Being out of the cavity of the uterus, it is manifest that no contractions of this organ could possibly influence the placenta, and experience demonstrates that the placenta is almost universally readily expelled by the abdominal muscles and diaphragm. If these be not thrown into action from any cause, the placenta may be retained, as is often observed, for hours, or it may be for one or two days, to the annoyance of the patient, and exciting the anxiety of friends, and even of the accoucheur. If, in these cases, a decided bearing-down effort be made by the patient, the placenta can very generally be expelled, even without the assistance of the practitioner.

We are surprised to find that Drs. Ramsbotham and Churchill speak of the contractions of the vagina as the agents by which the after-birth is thrown out of this canal; and, therefore, the retention of the placenta in the vagina is attributed to the feebleness of its contractions. We must acknowledge that we have never been

able to perceive the least evidence of contractility in the vagina after the birth of the child; this power, at all times trifling, seems to be completely suspended by the enormous distension and elongation of the parietes of this canal which occur during labor. Hence, after delivery of the child, it is invariably thrown into folds, and sometimes, especially in multiparous patients, it is exceedingly relaxed, manifesting no disposition whatever to diminish its own size, and, of course, to act upon the placenta, which body would, therefore, remain quiescent in its cavity, if no other force be applied. It is true, that the sphincters of the vagina and rectum, and the levatores ani muscles contract immediately after the delivery of the child; but all such contractions have a tendency to retard, not to accelerate, the delivery of the placenta.

It is all important to remark that in all the varieties of pelvic deliveries, after the body of the fœtus has been born, the head of the child, with some rare exceptions, is out of the uterus, and in the vagina. Hence, no contractions of the uterus can assist in its expulsion, which is to be accomplished solely by the powerful bearing-down efforts of the mother. Very many children have perished through the ignorance or thoughtlessness of the accoucheur, who had waited for the return of uterine contractions to deliver the head, instead of exhorting the patient to exert her voluntary powers, while, if necessary, due assistance should have been rendered by her professional attendant. The author has, with sorrow, witnessed cases of this kind. In one instance, at least, ergot even had been exhibited to restore uterine action, which, if it had returned, could not possibly have influenced the expulsion of the head of the child.

Those who are at all cognizant with labor, are familiar with the wonderful exertions, which even delicate women make, during the second or expulsive stage of labor. They must, also, perceive that these efforts are not simply confined to the parietes of the abdomen, but that the whole muscular system, not only of the body, but of the extremities, and even of the neck and head, are thrown into violent, tonic, and even spasmodic contractions. This effort is almost involuntary; it arises from the necessity of making the thorax and pelvis fixed points or fulcra, upon which the abdominal muscles can act with a greater efficiency in compressing the uterus and other viscera of the abdomen. Even in the common straining efforts, which individuals make in attempting to lift weights, etc., the thorax is dilated by a full inspiration, the breath is held, and the muscles of the chest, and even arms, are thrown into action to maintain a quiescence of the chest, that the abdominal muscles may act efficiently. In labor, this

dilatation of the chest and contraction of the muscles of the extremities exist to the greatest degree; the female takes a full breath, suspends respiration, seizes some firm body with her hands or arms, so as to fix the chest, and give the most effectual assistance to the diaphragm and abdominal muscles during the throes of labor. It will be found, also, that these efforts involve the muscles of the neck, face, etc., which are all thrown into powerful action. The pelvis is, in like manner, fixed by the contraction of all the muscles of the lower extremities, the feet or knees being pressed firmly upon some resisting surface.

The power, therefore, exerted by the muscular parietes of the abdomen, during labor, especially in strong women, is immense, and, indeed, can hardly be estimated. Owing to the fixed character of the uterus at its lower segment, the thinness of its walls, and its close proximity to the body of the child, the whole of this force may be considered as acting directly upon the child, forcing it into and through the cavity of the pelvis, and greatly contributing to the completion of labor.

So great is this power that many authors consider it the only efficient one during the second stage; they contend that the os uteri being dilated, and the cavity of the uterus being diminished by the tonic contractions of the uterus, this organ contributes very little to the descent of the child. Certainly, in many cases of labor, the whole work seems to be accomplished by the abdominal muscles and diaphragm. Nevertheless, it is evident that, during the expulsive stage, the actions of the uterus are usually very efficient, and the child is expelled by the conjoined influence of the powers of the uterus and those of the walls of the abdomen. We have already mentioned that, in some few instances, labor has been accomplished solely by uterine action. On the contrary, in some cases of inertia of the uterus, the expulsion of the child is effected entirely by the bearing-down efforts after the os uteri has been dilated. Both these are exceptionable cases; in normal cases, each power acts simultaneously and powerfully; the degree of efficiency varies in different women, and also in the same woman in different labors.

Moreover, the accessory powers are very essential, when, from any cause, the uterine contractions are partially or completely suspended, and artificial assistance becomes requisite for a timely or safe delivery.

THE STAGES OF LABOR.—From this history of the causes and the powers of labor, it is evident that three great objects are to be accomplished: *first*, the opening of the os uteri; *second*, the expulsion of the child; and, *third*, the expulsion of the placenta. These in-

clude the whole process of parturition. Labor, therefore, has been generally and very advantageously divided into three stages:—

First. The stage of dilatation, or that during which the orifice of the uterus is enlarged sufficiently for the transit of the child.

Second. The stage of expulsion of the child, during which it passes out of the uterus through the vagina, to be delivered externally.

Third. The stage of expulsion of the placenta, during which it is forced, not only from the uterus, but also from the vagina.

SYMPTOMS OF LABOR.—Each of these stages has peculiar phenomena, with which the practitioner should be familiar. We speak, therefore, of the symptoms of the different stages of labor.

There are, however, certain phenomena, which often precede labor, indicating its approach, and the preparatory changes which facilitate this important process. These are

The Premonitory Symptoms.—First, there occurs a *subsidence of the abdominal tumor*, or, as women express it, the “falling of the belly.” Females, for some hours, or even for days, are usually conscious of a diminution of their size; there is less fulness of the upper part of the abdomen, often more pressure toward the hypogastric and iliac regions, and more frequent inclination to urinate, with some pressure and fulness about the rectum and perineum. There is, also, a sense of relief about the heart and lungs, and even the brain—the patient breathes easier and more freely, the heart is less oppressed, while the mind and spirits are brighter; she is more cheerful, and says “she has not felt so well for a long time.” There is often, however, an increased sensation of fulness in the lower extremities, and a diminished disposition to locomotion.

Careful examination confirms, to a certain extent, these sensations of the patient; there is evidently less fulness in the upper part of the abdomen; the fundus is less elevated, while the whole body of the uterus feels more dense; and per vaginam it is ascertained that the os uteri is lower, and rather nearer the sacrum, while the inferior portion of the uterus projects more into the pelvis, and the presenting part of the child can often be felt through its walls.

Labor, therefore, is said to be near, because the uterus has descended. The explanation of this phenomenon is not very evident, as the contents of the uterus are in no ways diminished, and the ovum is incompressible. It appears to depend mainly on the condensation of the uterine tissues from the “insensible tonic contractions,” and the more conical form acquired by the

lower segment of the uterus, so as to allow it to project into the pelvis through the superior strait. The diminution of the abdominal swelling is, however, to no great extent, being more apparent than real, and often depending upon a more complete emptying of the bowels of gaseous and feculent matters.

Second. *The relaxation of the soft parts* is a wonderful and admirable provision of nature for facilitating parturition in all females. The original or exciting cause is hid in obscurity; but the final cause is most evident and advantageous, greatly assisting the processes of labor, and diminishing the sufferings of the patient. This state of softening or relaxation of the tissues is, of course, directly opposed to that of hardness or rigidity, and implies a diminution of vital excitement in the circulatory and nervous systems. When the blood-vessels are congested and much excited, the parts are dry and rigid; but when this excitement is lessened, free secretion and excretion follow, diminishing the tonicity of the tissues, and favoring their distension. We observe, therefore, in healthy females, for some days or hours before labor, increased mucoid or seroid deposits or discharges about the vagina; and, not unfrequently, free evacuations of semi-gelatinous matters from the neck of the uterus, which matter, during pregnancy, had occupied the cervix. There are also increased exhalations into all the pelvic tissues, and into the external organs—especially the labia, orifice of the vagina and perineum—and also upon the surface of the cutaneous and mucous tissues. All these effusions facilitate the softening and the relaxation of the tissues, thus favoring their subsequent distension.

In many females of nervous temperament, these important changes are not to be observed, or occur imperfectly. Even in delicate, weak, and anæmic girls there is a good deal of local nervous irritation or excitement, with little disposition to secretion; the parts, therefore, are contracted, dry, and unyielding, giving no indication of the approach of labor; and this state may continue even far into the second stage. When the nervous excitement diminishes, secretion and relaxation may ensue.

In women of an opposite temperament, who are strong and plethoric, the same dryness and rigidity may also exist, arising, however, from the great congestion and excitement of the blood-vessels. When these are diminished, increased secretion ensues, and is followed by a softening and relaxation of the genitals.

Third. *The discharge of blood* in small quantities, a “show,” and mixed with mucous matters, is the most decided premonitory symptom, as it comparatively seldom appears, unless there has been some previous contraction of the neck of the uterus, and a slight

separation of the membranes—the blood coming from the ruptured vessels connecting the uterus and the membranes. When this separation is free, of course the discharge is more copious; and when portions of the placenta are detached, it is so abundant as to be termed a “flooding,” which, of course, does not belong to natural labor, but becomes a serious complication.

Fourth. *Tenesmus*, or an increased disposition to empty the rectum, is also numbered among the premonitory symptoms.

Fifth. *Increased fulness and uneasiness of the mammae*, with a discharge of serous or milky matter from the nipples, sometimes indicate the approach of labor. These phenomena are very irregular and uncertain, varying in different women, and in the same woman in different pregnancies.

Symptoms of First Stage.—The symptoms just detailed as premonitory are often not observed until the actual commencement of labor; or, if they exist previously, are now decidedly augmented.

The first positive symptom of labor is the occurrence of *intermittent pains*, evincive of regular uterine contractions. These pains are first recognized, in most women, in the “small of the back,” or upper region of the sacrum. In others, they commence and continue, even during the whole of labor, in the abdomen; there being no suffering in the back. The sensation is at first trifling, perhaps hardly noticed; but the patient is surprised at finding it to recur at regular intervals of some twenty or thirty minutes, and gradually increasing in frequency and severity. It soon extends from the back to the lower part of the abdomen, to the groins and hypogastric region, and also down the thighs along the ischiatic nerves. The pains gradually become very severe, and, when in the lower part of the abdomen, are compared to a cutting, twisting, or grinding sensation. They are very trying to the patient, who regards them as unnatural, and as “doing no good,” although really indicative of those powerful alternate contractions by which the os uteri is dilated. The rapidity of dilatation is generally in proportion to the degree of suffering, although in many instances, especially in nervous women, there is great suffering, with very slow dilatation of the os uteri. In other cases, the dilatation goes on rapidly, and may be perfected with very little suffering, or even the consciousness of the patient.

During this process of dilatation there should be no bearing-down, but occasionally there is a great sensation of pressure or weight toward the end of this stage, which too frequently induces the woman to make some voluntary efforts to strain. Toward the termination of this process, the pains return very fre-

quently, every two or three minutes, and become quite prolonged until proper bearing-down efforts ensue, and thus the second stage of labor is fairly established.

During this stage, *sympathetic disturbances* are, of course, excited. The condition of the vagina, bladder, and rectum have been already noticed. There is often increased fulness and turgescence of the hemorrhoidal vessels, with an aggravation of the symptoms of piles, if they have previously existed. The stomach is often disturbed, usually there is much flatulency, with nausea, sickness, and not unfrequently vomiting. The discharges from the stomach are generally acid; and in the first instance the remains of undigested food, afterwards watery fluids, and occasionally some bilious matters are present. Generally, however, there is much straining, the patient throwing up little or nothing but gaseous fluids. This, in the language of the nursery, is “dry vomiting;” it is usually a very distressing and painful process, rendering the mind of the patient anxious. Vomiting is not really injurious, but is often, indeed, useful, by emptying the stomach of irritating matters, and at the same time the nausea and sickness promotes perspiration and the secretions generally, thus favoring the actual disposition to relaxation, and confirming the idea of the nurses that “sick labors are easy labors.” The bowels, also, are not unfrequently tympanitic, and their distension increases the nausea, pain, and distress of the patient; they are also usually torpid, notwithstanding the irritations of the rectum.

The *nervous system* is also disturbed in these preparatory or first symptoms of labor; hence the hands and feet are cold, and there are sensations of weakness and exhaustion, irregular flushings of the face, often chilly sensations alternating with heat, and sometimes tremors and general rigors. With one lady who had borne many children, a trembling or nervous chill was the first indication of labor. There are often cramps in the extremities, and frequently twitches and neuralgic pains about the face, neck, spine, etc.; an oppression about the heart and lungs; a disposition to sigh, and irregular respiration. The mind of the patient is often excited, and in a few instances pleasurably; but very generally the patient is depressed, anxious, apprehensive of evil for herself or her child, impatient, fretful, and irritable, especially toward the close of this first stage, when the pains return frequently and severely, and she cannot be persuaded that they are useful, but insists upon it that they “do no good;” that they are “mischievous;” and that she “cannot bear them.” Occasionally the state of the mind becomes distressing; the patient may lose her self-possession; some nervous delirium may exist—hysteria with or without convul-

sions. In other cases there is more languor and lassitude of mind and body, with feelings of exhaustion amounting to faintness, or complete syncope.

Such cases are, however, rare; and the woman usually passes through the first stage of labor without any serious disturbance of the nerves or of her mind and heart.

The *vascular system* is depressed at the commencement of labor. Not only are the hands and feet cold, but they are comparatively bloodless; the surface of the extremities, and frequently the body, is also cold, although the neck and face are often flushed; the skin is generally dry, with little disposition to perspiration, and the pulse quiet, and soft, until the pains begin to be frequent, when the circulation becomes gradually more active, and the skin warmer, until the second stage of labor is established.

Patients, of course, usually complain much during this process; there is sighing, groaning, and often painful exclamation; still, however, there is little or no disposition to hold the breath or to bear down.

On *examination per vaginam* the practitioner recognizes abundant secretions often with a little appearance of blood, and relaxation of the os vaginæ, perineum, vagina and other tissues of the pelvis. During the existence of pain he finds the edges of the os hard, rigid, and apparently unyielding; nevertheless, it perceptibly augments the size of the orifice. When the contraction subsides, the membranes or presenting part of the child retires, the ovum becomes relaxed, as also the tissues of the cervix; the orifice again diminishes in diameter. On a subsequent contraction, similar phenomena are presented, the opening still more enlarging, and, when the contraction ceases, the orifice remains more patulous. Toward the latter part of the process, the tension of the neck is less great, and the os dilates more rapidly, owing, doubtless, to the less resistance given by the circular fibres of the neck, or, as it is generally expressed, to their relaxation, which, as has been formerly mentioned, is more apparent than real. In primiparous women this dilating process will generally be tedious, and we have already noticed the various conditions of the cervix and os which retard or favor the yielding of the tissues of the cervix.

The practitioner also recognizes the membranes of the ovum, sometimes in close contact with the head of the child, occasionally projecting so slightly as simply to fill up the orifice of the uterus, and rendering it sometimes difficult, if the edges of the orifice be very thin, to recognize its position, or even its existence. Generally, however, owing to the quantity of the liquor amnii and the distensibility of the membranes, we recognize the protrusion of the ovum, and the greater

or lesser size of the bag of waters, gradually increasing as the edges of the os uteri are drawn up on the ovum toward the fundus of the uterus. It requires experience to form a correct opinion as to what may be the rapidity of labor, from the degree of relaxation which may exist, or from the various conditions of the cervix and os uteri.

By an external examination with the hand upon the abdomen, it will be found that whenever the contractions of the uterus ensue, the whole body of the uterus becomes hard, firm, and seems to rise up, protruding the lower part of the abdomen; when the contraction subsides, the uterus relaxes, and appears to fall toward the posterior part of the body, its outlines becoming indistinct.

The Diagnosis of Labor is seldom difficult, if attention be paid to the characters of the pains, and especially to the results of a vaginal examination. If the contractions be regularly established, and make their due impression upon the os uteri, it is very rare that any mistake can be made, or that the process will be arrested, however slow or tedious it may prove. Nevertheless, patients and practitioners also are often deceived as to the presence or absence of labor. The severe twisting or contracting pains of the uterus are often confounded with colic or spasms of the intestines, from which, however, they can readily be distinguished by the location and character of the pain, its sudden occurrence and persistence, the irregular and often protracted intervals, the presence of the usual symptoms of indigestion, and the absence of the firmness and elevation of the uterus at the lower parts of the abdomen. Should any doubt remain, an internal examination by the touch indicates no changes in the cervix or os uteri.

The uterus is also subject, during the latter periods of gestation, not unfrequently even during three months, to irregular spasmodic contraction of the muscular fibres, simulating very much those of regular labor; especially as the uterus becomes hard, with the sensations of weight and pressure inducing disposition to bear down, and frequent inclination to urinate. These are termed "false pains," uterine neuralgia, spasms, or uterine colics. They are, however, to be distinguished by their irregularity, not beginning moderately and gradually increasing, but generally commencing severely, and being more persistent with very irregular intervals, often intermitting for an hour or more, and then returning with more or less severity. These attacks are often periodical, returning for many days at particular hours, more frequently soon after the patient retires at night; indeed, with many, the mere act of lying down seeming to be an exciting

cause. Severe, however, as these pains are, even when often recurring, no impression is made on the os uteri, and there is no descent of the uterus into the pelvis, as is observed at the commencement of labor.

The causes of these false pains are numerous; they are more apt to occur in those of a nervous temperament, and in multiparous women, especially when there is great relaxation of the abdominal muscles. They are often more directly excited by mental agitations and anxieties, fear, anger, etc., and by the various irritations arising from dyspepsia, particularly from flatulency, undigested food, constipation, tympanites, impaction of the rectum with feculent matter, distension of the bladder, etc. Hence, attacks of gastrodynia or colics not unfrequently excite these irregular uterine contractions; they may be also brought on by over-exertion, long walks, fatiguing journeys, straining efforts, and also by exposure to cold.

The practitioner may be deceived by the representations of patients, who insist that their sufferings cannot possibly be those of labor, inasmuch as no pregnancy, they say, exists. Against such deceptions he should be upon his guard.

The *locality* or *seat* of "false pains," we have already remarked, is in the uterus. This is confirmed by the sensations of the patients, who almost universally regard them as labor-pains; by the hardness of the uterus during their existence; frequently by changes in its form, and by sensation of pressure or weight at the lower part of the abdomen. Drs. Ramsbotham, Churchill, Meigs, and others refer them to the abdominal muscles, without, however, stating any special reasons for this assertion. We have seldom been able to recognize any irregular or spasmodic action of the muscles of the abdomen during the existence of such pains, although, of course, there is a natural disposition of the patient to hold her breath, or to strain when in a state of suffering. The fact, that the os uteri is not affected by these false pains, is no proof that their location is not in the uterus; as partial contractions of the uterus are often known to occur during pregnancy, during labor, and especially after delivery.

Others have supposed that the seat was in the intestines; as intestinal irritations often excite such pains. But false pains differ materially as to their character and location, as well as in their effects from gastrodynia, and also from colic.

Rheumatism of the uterus has been suggested by M. Wiegand and Dr. Meigs as accounting for some forms of spurious pains. This may be occasionally correct, as we know that the uterus is sometimes liable to rheumatic affections; and hence, exposure to cold may be one of the exciting causes of spurious pains. But,

nevertheless, it confirms the idea that the location is in the uterus. Our experience, however, is that such rheumatic irritations are very rare; and that irritability of the uterus, which very often exists in the unimpregnated condition, continues through pregnancy, and hence gives rise to great soreness of the uterus, tenderness on pressure, and great sensibility even to the motions of the infant; and also irregular neuralgic pains, cramps and spasms of the uterus, or, in other words, to false or spurious pains.

It would appear, therefore, that from actual temperament, from irritable condition of the uterus, from rheumatic tendencies, or other circumstances, some women are predisposed to these irregular contractions of the uterus, which may be excited by any accidental cause, whether mental, moral, or physical.

The prognosis of the duration of the first stage of labor, cannot be certainly determined, even by the experienced practitioner; still, however, by careful attention to the degree of relaxation, the regularity of the contractions, their rapidity and power, and the effects produced upon the os uteri, a proximate idea can be formed of the result. Much prudence is requisite, in expressing an opinion, or in making fair promises to his interesting and anxious patient, for fear some disappointment may ensue.

The duration of the first stage of labor is very universally long, in proportion to the other stages; perhaps, it may be stated, that if the whole process occupy twelve hours, at least ten will be required for the dilatation of the os uteri. Nevertheless, the time required varies exceedingly, depending upon innumerable circumstances, especially the degree of relaxation or rigidity of the tissues, the presence or absence of sympathetic irritations and nervous or vascular excitement, as well as upon the peculiar temperaments, constitutions, and predispositions of individuals. Although painful, it is generally a safe stage of labor for the mother, as well as the child; the former not being usually liable at this time to any of the accidental complications of labor, and the latter, the membranes being unruptured, is very slightly disturbed by the contractions of the uterus, which, therefore, have no effect in compressing its tissues, or injuring the attachments and functions of the placenta. Occasionally, the child seems restless, and its motions more active after there is a subsidence of the abdominal tumor, and when uterine contractions are regularly established.

Symptoms of the Second Stage.—The symptoms of the first stage of labor gradually and insensibly glide into those of the second, the contractions of the uterus rapidly becoming more frequent, returning every two or three minutes, and are also more prolonged. The

sensations of weight and pressure in the pelvic region are so great that the disposition to strain becomes very urgent, and almost involuntary. This should now be indulged, and thus all the original and accessory powers soon become energetically exerted, in fixing the uterus and pressing its fundus and walls, and, of course, the ovum, toward the pelvis. As already mentioned, these bearing-down efforts necessitate the active co-operation of the other voluntary muscles of the body, so that at every returning contraction of the uterus, the most violent muscular efforts of the patient are made, and the second stage of labor completely inaugurated; the sufferings of the patient becoming more continued and more intense.

Respiration is, of course, greatly disturbed, and even partially suspended by these exertions, as the patient, after dilating the chest, holds her breath, suspending expiration that the chest may become more fixed, and thus a better support for the abdominal muscles. This temporary suspension of respiration interferes with the process of hæmatisation, with the oxygenation and decarbonization of the blood, and, of course, also with its ready transit along the pulmonary capillaries, as in cases of asphyxia from any cause. The results, therefore, are a turgescence, or congestion of the pulmonary artery, of the right ventricle of the heart, of the right auricle, and, of course, the ascending and descending venæ cavæ and their radicles. Hence, we find that during these spasmodic muscular efforts there is great venous congestion, especially observed in the neck and head; not only is a bluish tinge given to the cutaneous tissues, to the eye, etc., but the whole neck and face become swollen and turgid—the eyes are injected, and all the superficial veins, especially the external jugular, become greatly distended, and, no doubt, an analogous condition of the internal venous vessels is also induced, implying a passive congestion of the brain and its tissues. The features, of course, are distorted, the natural expression destroyed, and not unfrequently œdematous effusions occur in the cellular tissues, continuing for hours and even days after delivery. Watery and mucoid discharges from the injected vessels of the eyes, nose, mouth, etc., take place, and, in some few instances, effusions of blood are perceived underneath the conjunctiva of the eye, occasionally upon its surface, and also upon the mucous membrane of the nose, throat, and even of the bronchiæ. In bad cases, such effusions have occurred within the cavity of the cranium, increasing the bad consequences of congestion, even to a fatal extent. Post-mortem examinations have demonstrated the existence of venous or sanguineous deposits in the ventricles, in the substance, or on the surface of the brain. Such extreme cases are, of course, very rare.

The thyroid gland in front of the trachea, from its great vascularity, not unfrequently suffers to a marked degree from these congestions; it is often, therefore, swollen at the time of labor. This tumefaction, from effusion or other causes, may remain for months, or even years, disfiguring the neck, as in other analogous cases of goitre.

As soon as the bearing-down effort has subsided, the oppression about the chest induces the patient to make a full inspiration, a deep sigh, by which hæmatisation is again rapidly effected, and the bad consequences just enumerated are, to a great degree, counteracted. The longer the intervals between the pains, the less disturbance will there be in the function of respiration, and, of course, in the pulmonary and cerebral circulation.

The *circulation of the blood* is not merely disturbed in the manner just mentioned, but becomes exceedingly active in consequence of the violent nervous and muscular excitements which are induced. This excitement is perfectly analogous to that resulting from severe muscular effort, as in running, wrestling, etc. Hence, even before the first stage of labor is over, the coldness and pallor of the extremities and surface vanish. The hands, feet, etc., become warm, turgid, and red from the activity of the capillary circulation; the pulse becomes full, strong, bounding, as well as more frequent. There is an increased activity and energy also in the actions of the heart, hence the whole circulatory apparatus is violently excited; the secretions become abundant, the surface of the body is bathed with perspiration, and a rapid increase of the vaginal and other pelvic exhalations occur, favoring a still greater relaxation of the tissues, and a corresponding condition in other parts, external and internal. This increase in the arterial circulation favors an active determination of the blood to the head, chest, and abdomen, augmenting the evil consequences of any predisposition to congestion or other affections of the viscera. Hence, in labor there is more or less active and passive congestion co-existent in the brain, lungs and heart; the former, of course, arising from the excitement of the arterial system, and the latter from the disturbance of respiration. Therefore disorders of the functions of these organs, especially the susceptible tissues of the brain, the centre of the nervous system, are more frequent than upon ordinary occasions, increasing, therefore, the liability to effusions, convulsions, etc.

The *nervous system*, irritated during the first stage of labor, becomes still more excited during the increased muscular efforts subsequently induced. The characteristics of this nervous excitement are, however, altered. The irritability, impatience, and other mental disturbances of the woman are changed; though still

apprehensive of danger, the mind is more composed, and is so occupied with the intensity of suffering, and the violent muscular exertions, that she is less anxious respecting herself and child. She feels now that she has a "work to perform," that her "pains are doing her good," and that there is a "prospect of relief." If, however, the labor be greatly prolonged, then she has apprehensions as to the result of the labor for herself, the child being then generally forgotten. Occasionally, there is a great deal of mental excitement, amounting to nervous delirium, or a kind of mania, from which the patient loses her self-command, and occasionally becomes almost uncontrollable.

In some few cases, a nervous chill or rigor ensues, not accompanied, however, with sensations of coldness, or with diminished redness of the surface; but excited by the pain and muscular efforts of the patient, the circulation, general and local, continues active. Cramps and spasms are occasionally present, sometimes in the muscles of the body and upper extremities, but much more frequently in the lower limbs, particularly in the gastrocnemius and anterior tibial muscles; these depend, however, not so much on the state of the general nervous system as upon the pressure of the child upon the nerves of the pelvis. Of course, in some instances, the degree of disturbance of the nervous system may be so great as to excite hysterical or other varieties of convulsions.

The *stomach* is generally in a better condition than in the early stage of labor; the nausea and vomiting usually disappear, although the patient is sometimes tormented with flatulency, but there is usually no gastric or intestinal irritation.

The *consequences* or *effects* of all these exertions of the patient, whether voluntary or involuntary, are to force the uterus against the superior strait of the pelvis, and then to expel the child and its appendages. The firm pressure of the uterus against the margins of the pelvis increases the venous congestions, the disposition to varicose enlargement and œdema of the lower extremities; and the turgescence and bad consequences resulting therefrom in the hemorrhoidal and other venous vessels of the pelvis. The bladder being compressed between the abdominal muscles and the uterus, is generally emptied, but occasionally, from the pressure of the child against the urethra, there is a partial or complete retention of urine; the bladder, in such cases, being developed above the pubis, where a soft fluctuating tumor can be felt on the anterior surface of the uterus. The os uteri being dilated and the bag of waters formed, the bearing-down efforts are soon followed by a rupture of the membranes, and the rapid discharge of the liquor amnii; the rupture occurring

at the mouth of the uterus, when the bag is small, or at the orifice of the vagina when it is large, being the points where it is least supported.

The waters being evacuated, there is a momentary relief to the patient; the sense of weight or pressure in the pelvis, and the great feeling of distension of the abdomen, partially disappear. The uterus immediately contracts, so as to embrace firmly the body of the child, the motions of which now, or very soon, become suspended. The contractions of the uterus soon return with increased vehemence and frequency, being generally inversely to the size of the uterus. The first consequence of these powerful contractions is to increase the elliptical form of the child; its body becomes more bent, the head flexed toward the chest, and the limbs gathered up in front of the chest and abdomen.

The child now descends into the pelvis, and if the os be fully dilated, the head or presenting part speedily escapes from the uterus, and soon a firm pressure is made against the rectum, perineum, and other tissues at the floor of the pelvis. Hence, a sense of pressure and fulness of the rectum, as if the bowels must be moved. If any flatus or feculent matter be present, it is pressed downward and outward, so as to escape from the rectum; the anterior and posterior walls of this bowel are brought into contact, so that the whole tube is flattened, and therefore encroaches little or nothing upon the cavity of the pelvis. About this period, also, pressure is made upon the nerves of the pelvis, occasionally upon the obturators, exciting neuralgia and spasmodic pains on the inner side of the thighs, but more frequently upon the great sacral nerves, as they pass out from the anterior surface of the sacrum, and also on the sacro-ischiatic plexuses, exciting violent cramps and spasms in the muscles of the legs, feet, etc.

The descent of the head continuing, the levatores ani muscles, and all the tissues at the outlet of the pelvis, are elongated, and greatly protruded; the pressure begins posteriorly, so that the os coccygis is extended, and the posterior perineum is stretched, and soon the whole perineum is enormously distended by the presence of the head. The os vaginæ, being carried forward, and the direction of its plane being greatly altered, instead of running almost directly parallel to the crura of the ischia, now becomes very oblique, and forms an obtuse angle with the body of the pubis; its superior portion being, of course, fixed at the pubis, and the inferior portion pushed forward. (Plate V., Fig. 39.) During this process of distension, the whole length of the vagina and rectum is greatly increased; the anus becomes distended, assuming an oval shape, and the anterior wall of the rectum appearing at the

orifice. The anterior perineum is now greatly thinned, and is pressed out over the head of the child; and the distension of all the tissues is often so great, that while the os frontis is at the extremity of the coccyx, the occiput is at the vulva—the whole head being enveloped by the perineum, and giving intense agony to the patient.

After more or less suffering and effort, the os vaginae becomes more and more distended by the protrusion of the occiput; the orifice of the urethra and a fold of the vagina project a little from under the arch; the nymphæ are turned to either side, but are not unfolded, and do not contribute to the enlargement of the orifice of the vagina. The same observation is true of the labia externa, which are also pushed aside, so as to give a triangular shape to the vulva; no portion of them contributing to the enlargement of the orifice, excepting at their inferior extremities, which become flattened, and lost, as it were, on the sides of the distended perineum. Eventually, the os vaginae is dilated sufficiently for the passage of the great occipital extremity of the head; and the edges slip over the parietal protuberances, the points of greatest resistance. The fourchette, or posterior margin of the vulva, now slides rapidly over the anterior fontanel, the forehead, face, and lower jaw of the child slipping to the anterior part of the neck, while the occiput rises more and more in front of the symphysis pubis, until the perineum passes over the chin, when the whole head is completely liberated, and the neck of the child occupies the orifice of the vagina. (Plate VII., Fig. 47.)

This retraction of the perineum is owing much to the great elasticity of its tissues, and much, also, to the contraction of the levatores ani and other muscles constituting the floor of the pelvis. It commences as soon as the edges of the os vaginae pass over the parietal protuberances, and then may be considered as an additional agent, facilitating the expulsion of the head, while, prior to this event, the elastic and muscular powers of the perineum retard the progress of the head.

The head being thus born, accompanied by an excessively sharp, cutting sensation, affords immediate and wonderful relief to the patient; the greatest difficulty has been accomplished. In a few moments, however, there is a slight return of pain, followed by a bearing-down effort; the shoulders now press upon the perineum, which is again distended by the posterior or sacral shoulder of the child to a moderate degree; it soon escapes, and the rest of the body glides rapidly through the now relaxed orifice of the vagina, and the whole perineum, owing to the great elasticity and con-

tractility of the tissues, collapses, and returns to its normal position. The uterus, still retaining the placenta, occupies the hypogastrium, and can be felt through the relaxed parietes of the abdomen as a hard, dense body, extending from the symphysis pubis near to the umbilicus. Some discharge of blood, often coagulated, follows the delivery of the fetus. The alternate contractions of the uterus cease entirely; and, with them, the horrible suffering and distress which accompanied the last throes of labor. The physical relief is great, but does not, perhaps, equal that of the mind. The patient feels "as if she were in a new world;" the transition from the most intense agony to comparative comfort is, indeed, great; the mind is immediately relieved from its dreadful apprehensions, while the joys of maternity, now, for the first time, realized, seem to be a full compensation for her previous sufferings. This pleasurable mental excitement may disturb the equanimity of the nervous system, and may be followed by some hysterical symptoms, which are, usually, however, but transitory.

This second stage of labor is *short*, compared with the first, occupying about an hour, or an hour and a half, in a labor of twelve hours' duration. The period, however, varies exceedingly; depending upon the powers of the patient, the relaxation of the tissues, and various other circumstances, being generally short in multiparous, and long in primiparous women.

The duration of this stage is influenced, according to some authorities, by original temperament or constitution, and hence, said to be tedious or rapid from hereditary predisposition.

The age of the patient is said, also, to influence the duration of the second stage, especially in primiparous women; it is said, therefore, to be tedious when the mother is very young, or when quite advanced. Women who are not married until after thirty-five years of age, have, therefore, great dread as to the result of parturition. There may be some grounds for this apprehension; but the exceptions are so numerous, that we must agree with Madame Lachapelle, Cazeaux, and others, who deem labor as easy, if not more so, at thirty-five as at fifteen.

As to the duration of each pain, Dr. Meigs observes that the pains last from fifteen to thirty or forty seconds, and even longer. The intervals between each pain are, at first, from twelve to thirty minutes; these, however, diminish subsequently to five, three, two, and one minute. Thus, in a labor of four hours, the probability is, that a woman will have forty-seven pains, or about thirty minutes of suffering, and three hours and a half of intervals. This, however, is a mere approximation to the truth, as the intervals are often longer and the

contractions shorter; while, in other cases, the contractions are vehement and prolonged, and the intervals exceedingly short. Labor, also, is sometimes very short; while, in other instances, it continues even four or five days, with almost continued suffering.

This is, however, a stage of great *danger* to the mother, and also to the child. The former is liable to all those accidents which may arise from disturbance of the vascular and nervous systems, to irritations and injuries of the uterus, the vagina, and perineum, and, indeed, to most of those complications which give rise to tedious and difficult or impracticable labors. The latter (the child) may have its functions impeded, suspended, or actually destroyed by the powerful compression made upon its tissues, including the cord and placenta; endangering, and sometimes destroying its life.

Symptoms of the Third Stage.—The respite from suffering after the birth of the child seldom lasts longer than from ten to fifteen minutes, when the patient's fears are again aroused by the recurrence of pain, with a disposition to bear down. A hand upon the abdomen recognizes renewed hardness and tension of the uterine tumor, followed by diminution of size, and further descent of the organ toward the cavity of the pelvis. A finger within the vagina recognizes at this time similar firmness and contraction of the cervix, and also the presence of the placenta at the orifice of the uterus, and very soon its descent into the vagina. The active contractions of the uterus now disappear, but the bearing-down efforts still continue until the placenta is forced from the cavity of the vagina, and delivered externally. The placenta usually presents its foetal surface, but not unfrequently its edge or uterine surface, at the vulva. The delivery of the placenta with the remains of the membranes attached to its edges is thus accomplished; and coagulated blood, which may exist in the mouth of the uterus, or collect in the vagina, is thrown off in the same manner.

These phenomena, characterizing the third stage of labor, indicate the detachment and expulsion of the placenta.

If, on the delivery of the child, the placenta be still adherent to the internal surface of the uterus, there are three distinct periods to be indicated in this stage:—

The First Period is the detachment and separation of the placenta from the internal surface of the uterus. This, as formerly explained, is effected simply by the contraction of the uterine fibres.

The Second Period embraces the expulsion of the placenta from the cavity of the uterus into the vagina. This, also, is chiefly accomplished by the contractions

of the uterus, stimulated into action by the presence of the after-birth, now detached, and acting as a foreign body.

These expulsive efforts of the uterus, however, are assisted by the bearing-down of the mother, acting through the parietes of the uterus.

The Third Period is the expulsion of the placenta from the vagina, which is effected entirely by the abdominal muscles and diaphragm, and of course without any assistance from the uterus, which is now fully contracted and quiescent.

Blood, fluid or coagulated, which issues, in greater or less quantity, from the venous orifices, exposed by the separation of the placenta, is expelled in an analogous manner; that is, when in the uterus, by the contractions of this organ, assisted by the abdominal muscles, or when in the vagina, simply by the "bearing-down efforts."

No contractions of the vagina, as we have formerly shown, assist the expulsion of the placenta, or of coagula.

Perhaps, in most instances of natural delivery, the placenta is detached by the last pains, which delivered the infant; and then this body is found at the lower part or at the orifice of the uterus. In such cases there are, of course, only two periods: that of expulsion from the uterus, and that from the vagina.

In other instances, after the expulsion of the child, the placenta is found completely in the vagina, so that but one period remains for this stage.

In a few rare instances the placenta immediately follows the birth of the child, the last efforts by which it is expelled detaching the placenta and expelling it from the uterus and vagina; so that the third stage of labor cannot be distinctly recognized.

Occasionally cases have been reported, where the whole ovum, with membranes unbroken, has been simultaneously delivered. These are very unfrequent.

The placenta and coagulated blood being thrown off, the third stage, and with it the whole process of delivery, may now be considered as completed. The deliverance is accomplished.

The uterus can now be felt still more contracted—occupying the lower part of the hypogastrium, the fundus extending half-way between the pubis and umbilicus; the form, somewhat flattened, can easily be recognized through the relaxed parietes of the abdomen, when there is no great obesity. The orifice of the uterus is perceived high up toward the superior strait, readily admitting the finger, which then recognizes the hard contracted tissues of the cervix. The vagina, lately so enormously dilated, is thrown into irregular folds, occupying the cavity of the pelvis; the orifice

of the vagina is collapsed, soft and relaxed, and, of course, very sensitive; frequently the posterior commissure of the vulva or frænum perinei, even in natural labors, has been torn, giving rise to a slight effusion of blood.

The separation and expulsion of the placenta is almost universally accompanied with more or less discharge of blood, generally proportioned to the degree of contraction or relaxation of the uterine tissues. Four to eight ounces are perhaps generally lost soon after the child is born, and subsequently, under the name of lochiæ, more or less blood and other fluids continue to be discharged for several days.

The *duration* of this stage of labor is generally short, usually terminating in ten or fifteen minutes after the delivery of the child. When the whole labor is protracted to twelve hours, perhaps half an hour may be allowed to this concluding stage of the process.

It is, however, to be regarded as a stage of *danger* for the mother; of course, the child's welfare is not involved: it now enjoys an independent existence. The mother, however, may suffer from exhaustion and syncope; or she even may die from a sudden collapse after so much exertion, but much more frequently in consequence of severe hemorrhage or flooding, preceding or following the delivery of the placenta. Hys-

terical symptoms, puerperal convulsions, or other accidents, may also complicate this third stage of labor.

Delivery being now accomplished, the nervous and vascular excitements rapidly disappear. The patient feels weak, sometimes faint and exhausted, as if she could not make any muscular effort; and sometimes there is a feeling of oppression about the chest, or sensation of emptiness in the abdomen, arising partially from the sudden collapse of its walls. The woman often feels cold, especially in the lower extremities; she is chilly, and not unfrequently has a general tremor or rigor of a nervous character, with some depression and anxiety of mind. The circulation, also, is depressed, the pulse loses its fullness and frequency, and becomes small and often weak, while the capillary circulation is greatly diminished; the hands and feet become pallid, perspiration is checked, and the injection of the eyes, face, etc., disappears. Generally, however, in the course of twenty or thirty minutes, there is a reaction, the chilly sensations and rigors vanish, the surface becomes warmer, the capillary circulation is restored, and the pulse is more full, distinct, and natural. The mother, in possession of her new treasure, feels happy, and at the same time is disposed, by rest, quietness, and sleep, to refresh her exhausted system, mental and corporeal.

CHAPTER VIII.

EUTOCIA.—MECHANISM OF LABOR.—VERTEX PRESENTATIONS.

THE various phenomena, just detailed, as the symptoms indicative of the commencement, progress, and termination of labor, are those which address themselves to almost any ordinary observer of this important function. Much more, however, is to be studied as to the details of the process, the operation of the powers by which it is accomplished, and the influences which they exert in effecting the delivery of the child, in order to understand scientifically the mode and manner in which the child descends in all the various presentations and positions met with in practice. Such knowledge is absolutely required, that the obstetrician may be prepared to detect any variation, however slight, from the natural process, that he may facilitate,

assist, or alter the circumstances of the labor, so as to render it as easy and safe to the mother and child as is practicable. Perfect acquaintance with these details in all their minutiae is the real foundation of scientific midwifery. No one can be prepared to render suitable assistance in cases of difficult or complicated labor, who is not fully informed as to the most easy and natural mode of delivery.

All obstetric operations ought to be performed, as far as practicable, in accordance with the natural modes of delivery. With comparatively few exceptions, all operative midwifery is designed to *facilitate* nature's efforts during labor, and seldom to alter or in any way to disturb such efforts. The accoucheur who is well acquainted

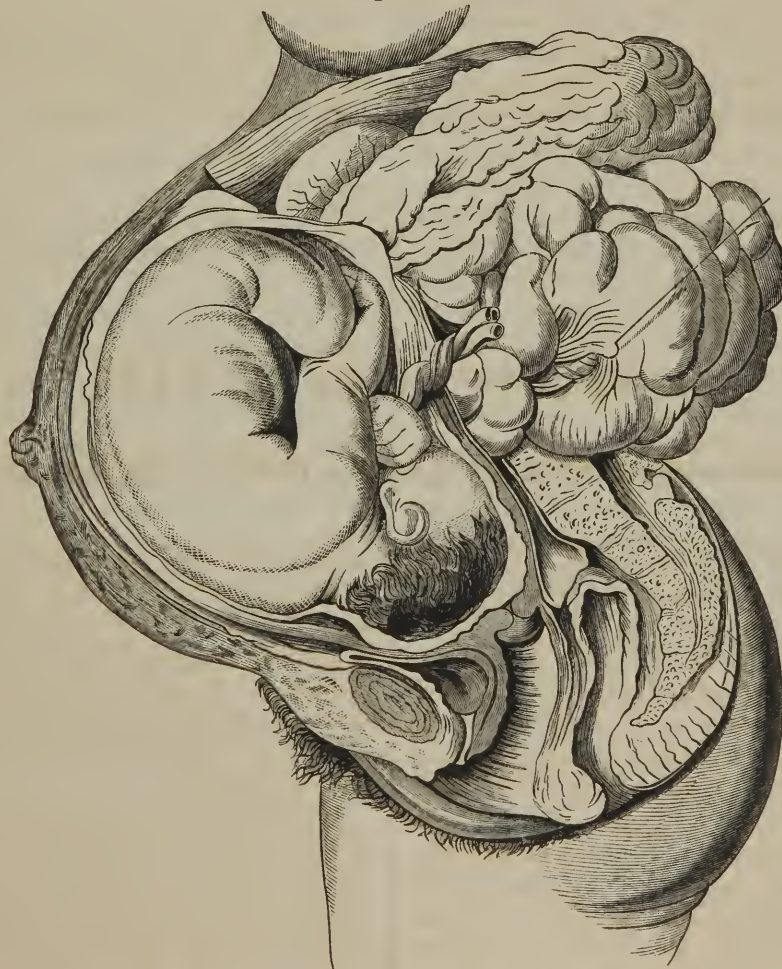
with the mechanism of labor, can, by various measures, facilitate such changes so as to shorten the progress of labor, and thus diminish the anxieties, the sufferings and dangers of the parturient woman, and greatly augment the chances in favor of the safety of her infant. On the contrary, the practitioner, ignorant of this natural mechanism, whatever may be his skill or experience, must either allow his delicate and anxious patient to work out her own delivery by protracted and continued suffering, or must operate, if assistance be deemed necessary, at the greatest possible risk to mother and child. The wonderful improvements, therefore, which, in modern times, have been made in the practice of obstetrics, have entirely resulted from the study of natural parturition. This is the universal testimony of late authorities.

Is this mechanism yet fully understood? We have no hesitation in giving the negative to this question. We feel confident that, although much has been done, much still remains for the perfect elucidation of this

physiological process. The study is of acknowledged difficulty, and must be regarded as still incomplete; inasmuch as, notwithstanding the great talent, science, and practical observation which, for more than a century, has been concentrated on the act of parturition, great differences of opinion still exist among the best authorities, both upon the theory and the practice of obstetrics. Professor Simpson, the present distinguished teacher of obstetrics in Edinburgh, speaking of the mechanism of labor among his countrymen, affirms, "there are few departments in midwifery upon which the practitioners of Great Britain entertain, generally speaking, more loose and more incorrect ideas." As late as the year 1841 he endorses the declaration of Dr. Denman, made more than half a century previously, that "natural labor is the last thing studied in England."

More precise notions have been entertained and taught by the Continental accoucheurs, but, even among them great differences of opinion still exists, especially

Fig. 33.



Relative Position of Child in the Uterus at term. (After Maygrier.)

owing to the influence which the German school, headed by M. Nægèlè, has, of late years, exercised over the theory and practice of obstetrics.

We will venture, also, to affirm that there is a great want of precision in the statements of authors, and, moreover, that the attempts lately made by scientific men to simplify our knowledge, have not, in all respects, been successful. It has been the practice of the author to watch carefully the whole progress of the second stage of labor, so as to render himself familiar with every minute change that takes place in the presentation or position of the child after the os uteri is dilated, until complete delivery. He has thus studied the process of parturition by careful attention at the bedside of his patient, rather than from the histories presented even by our best authors. The result of his investigations he will endeavor to present, hoping that he may contribute something toward the elucidation of the wonderful process of delivery in the human female, and thus establish more precise and correct principles for the guide of the practical obstetrician.

Before commencing a minute examination of the Mechanism of Labor, the student should have a correct idea of the form and postures usually assumed by the child at term, and, also, of the relative position occupied by the uterus, as respects the viscera of the abdomen and pelvis. These points are satisfactorily represented in the annexed drawing, copied from the illustrations of M. Maygrier. It will be observed, that the child's head is in a state of semi-flexion even before the os uteri is dilated, and that the convexity of the ellipse is very exactly accommodated to the concavity of the anterior part of the uterus, covered by the abdominal walls. It should be noted, that the pelvis is comparatively empty, a small portion of the uterus only projecting through the superior strait; that the os uteri is high up, and toward the posterior part of the pelvis; and that a projection of a portion of the uterus can be perceived between the os uteri and the pubis, caused by the head of the fœtus. This has occasionally been termed the "uterine tumor." The bladder will be seen above the pubis, where it is compressed between the uterus and the abdominal muscles. All the viscera of the abdomen are collected above and to the posterior part of the uterus, so that the anterior peritoneal surface of this organ is in close contact with the anterior parietes of the abdomen, covered internally with the peritoneum. Thus, the only tissues which exist between the body of the child and the skin of the mother are the membranes of the ovum, the proper tissues of the uterus, and the parietes of the abdomen.

By reference, also, to Plate V., Fig. 40, the student will perceive a representation of the changes effected

in the cervix and os uteri during the first stage of labor; and, also, he will notice the size and relative position of the "bag of waters," as usually existing before expulsive efforts have commenced.

Labor has already been defined to be a vital function; but, like all the vital functions of the body, it acts in accordance with physical laws. The vital and physical powers co-operate harmoniously to the attainment of the same object. Hence, we speak of the mechanism of labor, so important to be understood by the obstetric student. Although the vital powers are absolutely necessary for delivery, and although many of the resistances to the descent of the fœtus depend upon the vital tonicity and contractility of the tissues; yet, as the child is perfectly passive, it may be considered as a body to be forced through certain orifices and passages, in perfect obedience to the laws of mechanics, opposed, as it is, by various mechanical resistances, as well as by the contractility of tissues, acting also in accordance with physical laws.

In considering this subject of the mechanism of labor, we must examine,

First. The direction in which the powers operate; in other words, the direction in which the child is impelled by these powers.

Second. The various presentations and positions of the child at the commencement and during the progress of labor; and,

Third. The descent and expulsion of the child in any one of these various presentations.

I. THE DIRECTION OF THE POWERS.—The obstetric student, being acquainted with the position of the uterus in all its relations to the viscera of the abdomen at the full period of utero-gestation, and the changes which have occurred in the os uteri, during the first stage of labor, will easily comprehend how, when the bearing-down efforts commence, the body of the uterus will be pushed firmly against the anterior walls of the abdomen by the pressure of the abdominal muscles and diaphragm acting upon the posterior part of the uterus, through the medium of the liver, spleen, stomach, and intestines; so that the greater the effort that is made, so much the more effectually the fundus of the uterus will be driven forward toward the umbilicus and the linea alba. In this way, the lower part of the uterus being fixed at the brim of the pelvis, the axis of the uterus will be brought nearer to the direction of the axis of the superior strait of the pelvis. In labor there is also a natural disposition in the woman to bend forward, thus increasing the efficacy of the pressure of the viscera on the posterior portions of the uterus.

Very soon the bag of waters is ruptured on account of these powerful contractions, and the size of the uterus diminishes in proportion to the quantity of fluid expelled, and thus more room is obtained in the cavity of the abdomen. Hence, the natural disposition of the fundus to approximate the linea alba, from the causes just mentioned, will be greatly facilitated, and the axis of the uterus will be brought into almost exact parallelism or conformity with the axis of the superior strait, and the more powerful, therefore, the bearing-down efforts, the more exact will be this conformity. Hence, it results that, as the child must pass out of the os uteri, in the direction of the axis of the uterus, and as this axis corresponds with that of the superior strait, the direction in which the child is expelled by the conjoint action of the uterine and accessory powers, is in that of the axis of the superior strait of the pelvis; as the uterus maintains this same position until the expulsion of the child, the combined powers act invariably in one and the same direction until delivery is accomplished. This fundamental truth is not invalidated by the fact that the child does not pass in a straight line through the pelvis, but describes, under the resistance which it meets, a curved line corresponding to the axis of the pelvis and distended vagina.

II. PRESENTATIONS AND POSITIONS OF THE CHILD.—It is all important to affix precise meanings to these words in considering the mechanism of labor.

By *Presentation* should be understood that portion of the foetal ellipse which is recognized toward the *centre* of the canal of the pelvis and vagina; and to this meaning it should be carefully restricted. We speak, therefore, of a presentation of the vertex; that is, the posterior fontanel or the posterior angles of the parietal bones are felt toward the centre of the superior strait or that of the orifice of the uterus, at the commencement of labor; and, as this process advances, it is felt lower in the pelvis toward the coccygeal region or plane, but still toward the centre; then toward the middle of the inferior strait, and finally at the centre of the os vaginæ when fully dilated. This presentation, when once fully established, remains persistent to the end of the process. In other cases, for example, the anterior fontanel may present at the superior strait, and remain for a longer or a shorter time; but it may, in the process of labor, be changed to a presentation of the posterior fontanel or vertex; and so of other parts. The presentation, therefore, may or may not be persistent; we may speak, not only of presentations of the vertex, face, and other portions of the head, but also of the coccyx, shoulder, and other portions of the foetal ellipse.

The definition which we venture to give of "*Pre-*

sentation," we deem of great importance in studying the Mechanism of Labor, especially as by many this word has been confounded, and still is, with the word "Position;" and, moreover, there is a great want of precision in the use of the word "Presentation." For example, it is defined by many as that part of the child which is felt toward the superior strait, without specifying whether it be at the circumference or toward the middle of the strait. Hence, it is very common to read, even in the best authors, that the vertex presents at the orifice of the uterus; yet it may be declared in the next paragraph that the vertex is at the left acetabulum, or at the right, as if it were possible for the vertex to be in two places at the same time. This definition also includes merely the superior strait, without reference to the inferior strait, or to the orifice of the vagina, etc.

Another common definition of Presentation is that part of the child's head which is first touched by the finger on entering the vagina. This amounts to the declaration that the presenting part is that which, at the commencement, and during the progress of labor, is to be felt nearest the arch of the pubis; which, although countenanced by high authority, is evidently very incorrect, inasmuch as at the beginning of the labor one part of the head will be felt nearest the orifice, and as the process advances another part is recognized, and so in succession, until the posterior fontanel fairly appears at the orifice of the vagina. Hence, according to this definition, we might say that the side of the occiput, or the lateral portion of the parietal bone, first presented; then the occipital protuberance, and, finally, the posterior fontanel, and all this in an acknowledged vertex presentation. This definition also presupposes that the orifice of the vagina is at the bottom of the pelvis, which is, in reality, represented by the coccygeal region; while the vaginal opening, which represents the arch of the pubis, is strictly at the anterior portion of the cavity. (Plate II., Figs. 5 and 7.)

Dr. Tyler Smith is rather more accurate; he defines a presentation as the most prominent part felt "within the circle of the os uteri, the vagina, and the ostium vaginæ, in the successive stages of labor;" but there is still a want of precision in these expressions, as will be apparent to any one who would apply this definition while carefully observing the process of delivery. We will give but one illustration. When, in the vertex presentation, rotation is complete, and the head engaged in the inferior strait, with the perineum partially distended, the finger, introduced into the vagina, will come in contact with the occipital protuberance, which should therefore be termed, according to the above definition, the presenting part; while the

posterior part of the sagittal suture, or the posterior fontanel—the true presenting part—in a vertex presentation, is covered by the vagina, and may be found midway between the tubercles ischii at the centre of the strait. Labor will not be terminated until the head has advanced still further; or, in other words, until the occipital protuberance is in front of the pubis, and the posterior fontanel is apparent at the centre of the orifice of the vagina.

Position.—By *Position* is to be understood the various postures in which the body and limbs of the child may be placed in any given presentation; for example, the vertex may present and continue presenting, and yet the back and limbs of the child may be in different parts of the uterus. The limbs are sometimes to the right side and the spine of the child to the left side of the mother; in other cases, the reverse, the limbs to the left side and the spine to the right; the limbs may, also, be directly posterior or anterior, over the bodies or rami of the pubes. The child, therefore, is in different positions, and yet, on examination per vaginam, the vertex is felt, in these cases, toward the centre of the pelvis; the presentation, therefore, being the same, but the position of the child may vary almost indefinitely. In common professional language, we speak of “a position of a presentation;” that is, a particular portion of the child may be felt toward the centre of the pelvis, yet the position of the face or limbs may be various, as the child revolves on the presenting part as a centre. We have, therefore, various positions of a vertex, or any other presentation of the foetal ellipse.

These distinctions between the words “Presentation” and “Position” should be constantly remembered.

According to the definition now presented of the word “Presentation,” it is manifest that as any portion of the foetal ellipse may occasionally be felt toward the centre of the pelvis, the number of presentations might be multiplied indefinitely. Considering the subject, however, in a practical point of view, authors have differed exceedingly as to the number of presentations. Solayres, Baudelocque, and their numerous disciples in Europe and America, adopted some twenty-three presentations; many of these were again subdivided, and were considered as modified by the different “positions” of the body of the child. Experience has proved that many of these presentations are seldom if ever to be found, or are so transitory as not to deserve separate attention either in theory or practice. This remark applies especially to the numerous presentations of the trunk, as depicted by M. Baudelocque. These, according to the observations especially of Madame Lachapelle, are very generally resolved into presentations of

the right or left side of the thorax, including, of course, the right or left shoulder.

It is to M. Nægelè, of Heidelberg, however, that the profession have attributed great credit for reducing still further the number of presentations and positions, and thus simplifying, it is said, the study of obstetric science. M. Nægelè adopts but three fundamental presentations: the head, breech, and trunk. These, however, he increases to five, namely, the cranial or vertex, the facial, the pelvic, and the right and left shoulder presentations. In this he has been imitated by Stoltz, Dubois, Cazeaux, Simpson, Rigby, Tyler Smith,—indeed, very generally by late obstetric writers; and, no doubt, with considerable advantage to the student and practitioner of medicine.

This process of simplification, however, has, in our opinion, been carried too far, especially as regards cephalic presentations. The author having formed his opinions at the bedside, where he has carefully noted the causes of delay, difficulty, and danger arising from the various presentations of the foetus, has arrived at conclusions, perhaps, intermediate between the extreme views above presented. He would reject, therefore, the multiplication of presentations of the trunk and pelvis, but would retain those of the cephalic extremity of the ellipse, being fully persuaded of the great practical importance of a minute acquaintance with the mechanism of labor in the various presentations of the head, in addition to those of the vertex and face. The reasons of this opinion will, he trusts, satisfactorily appear while prosecuting the careful investigation of the natural process of delivery under the various presentations to be specified.

Under the head of *natural labor* or *eutocia* will be included but two presentations—the vertical and coccygeal extremities of the foetal ellipse.

Complicated labor (*dystocia*) from mal-presentation will be considered as embracing presentations of the top or base of the cranium, of the forehead, of the face, of the right or left side of the head, and also presentations of the right or left side of the trunk, or, as it is usually termed, right or left shoulder.

The arrangement, therefore, which we shall adopt will be three grand divisions of Cephalic, Pelvic, and Trunk presentations. The first, or Cephalic, will be subdivided into Presentations of the Occiput and Chin, the top and base of the Cranium, the Os Frontis, the Face, and Right and Left Sides of the Head, (or Right and Left Ear.) The Presentation of the Pelvis needs no subdivision; that of the Trunk will be subdivided into the Right or Left Side, or Right or Left Shoulder.

By this arrangement we shall have eleven different presentations to examine, instead of the twenty-three

of Baudelocque, or the still smaller number of five presentations as proposed by Nægelè. We cannot but believe that, while the system of Baudelocque has been justly considered as unnecessarily complicated, that of Nægelè is equally liable to criticism for its too great simplification. Thus, for example, Nægelè does not allude to presentations of the base of the head, so often troublesome and dangerous in pelvic deliveries; while presentations of the top of the head he terms vertical, and declares can pass as readily as presentations of the posterior fontanel, ignoring the fact recorded by Baudelocque, Velpeau, Dewees, and others, and confirmed by the experience of almost every accoucheur, that such presentations of the sinciput usually produce great delay at the commencement of labor, and that they frequently are not spontaneously rectified, but remain *persistent*, to the imminent danger of the child, and even of the mother.

The number of positions, also, may be indefinitely multiplied, according to the caprice or theory of any practitioner. Each presentation has usually been considered in at least two positions, some of them in four, others in six, or even eight positions. Hence, in Baudelocque's system with numerous presentations, the various positions amounted to ninety-five or a hundred. By diminishing, therefore, the number of presentations, we decrease also the number of positions, and thus facilitate the study of the mechanism of labor.

We have also ventured to depart from the almost universal practice of teachers by multiplying the positions of the face, pelvis, etc., considering these presentations as being modified by the position of the child in utero. In practice, we could never discover any reason why six positions of the breech or of the face were

not equally deserving of investigation as to their peculiarities as the six positions of the vertex. At the bedside it will be found that such positions modify the progress of the infant, and therefore require special treatment on the part of the accoucheur, as will be demonstrated in the sequel.

Let it be observed, however, for the encouragement of the student, that his labor will not be materially augmented with the increase of positions, inasmuch as all the essential points will be mastered by studying accurately one, or, at the utmost, two positions of any individual presentation.

DIVISION OF LABORS.

In consequence of the various presentations and positions of the child, labor may, of course, be facilitated or greatly retarded. It may be natural, preternatural, or even impracticable; hence, many authors have made the variety of presentations the foundation of the division of labors under various heads. But there are so many other circumstances which may complicate labor, not to be included under the head of mal-presentations, that any division founded upon presentations alone will be unsatisfactory. Different divisions have, therefore, been made according to the peculiar views or opinions of practitioners. Hence, we hear of natural or preternatural labors, referring chiefly to the different presentations; of simple, easy, or difficult labors, according to the time or other circumstances involved; hence, also, of practicable or impracticable labors, or favorable or unfavorable, of assisted or unassisted labors, of natural, manual, or instrumental labors, etc.

DIVISION OF LABORS.

EUTOCIA	{	Vertex presentations.
		Pelvic presentations.
DYSTOCIA	{	Various states of the foetus . . { Large heads. Mal-presentations. Plurality of children. Deformities.
		Conditions of the pelvis or uterus { Deformed pelvis. Displacements of the uterus.
		Physiological states { Inordinate excitement. Deficient excitement.
		Pathological states { Local. General.

We agree, however, with M. Velpeau, that the division of labors will be far more correct and scientific when founded on the causes which produce delay or difficulty in the process of parturition. Merriman and Desormeaux have adopted the same plan, examining the phenomena characteristic of regular or natural labor, and then studying the causes which disturb this function, rendering it more or less tedious, difficult, or impracticable.

Labor, therefore, is normal or abnormal, simple or complicated, or, in more technical language, it is termed *eutocia* or *dystocia*. The causes of *dystocia* are very numerous, some of minor importance, and others of the most grave character. We think that they can most advantageously be arranged under those dependent on the *fœtus*, on the uterus and pelvis, on physiological conditions of the woman, and, finally, upon various pathological states. Under these divisions may be readily included the various complications of labor, with sufficient accuracy for their proper consideration.

By *simple* or *natural* labor, therefore, is to be understood those cases in which the process is accomplished with safety to the mother and child, without any great danger or difficulty, and hence, not demanding the assistance of art or science. It is "unassisted labor."

It demands, on the part of the mother, that all the anatomical arrangements and her physiological states be perfectly normal; that there be no deformities, no disproportion between the size of the child and the passages of the pelvis; no inordinate excitements, nervous or muscular, and, of course, no pathological derangements. The phenomena of labor, both preparatory and actual, should be regular, and the results accomplished without unusual delay or difficulty.

As regards the child, there should be no deformity, which increases the magnitude of the head or body: but all those deformities which diminish the relative size of the child are not inconsistent with the idea of a natural labor; nor yet is any physiological or pathological condition, or even the death of the *fœtus*, inasmuch as the child is perfectly passive in delivery, and a sick or dead infant can pass as readily, if not more so, than a living child.

Moreover, the presentation of the child must be favorable. It was formerly taught that all presentations except those of the occiput were unfavorable, rendering the labor preternatural or complicated; but, in the present improved state of obstetric science, we ought to regard the presentation of either extremity of the *fœtal* ellipse as being favorable, and, therefore, to be considered under the head of natural labor.

We have, therefore, founded upon this idea two grand divisions of *eutocia*, or simple labor, one in which the

vertical, the other in which the coccygeal extremity of the *fœtal* ellipse is perceived toward the central portions of the pelvis; in other words, vertical and pelvic presentations of the child.

It is to be regretted that more unanimity among teachers does not exist on this point. A large proportion, for example, will exclude pelvic presentations from natural labors; while others, in their desire to simplify the process of labor, will include not merely pelvic presentations, but also presentations of the top of the head, of the forehead, of the face, of the sides of the head, under the general expression of natural labor; because it is possible, in some instances, for women to deliver themselves, under these circumstances, with safety. The latter do not seem to us to give sufficient value to the increased sufferings, the delays, and even the dangers to the mother and child, which so often occur in these various presentations. It will hereafter appear, more particularly, why we deem it important to confine natural presentations strictly to one or the other "pole" or extremity of the *fœtal* ellipse.

PRESENTATIONS OF THE POSTERIOR FONTANEL OR VERTEX.

Presentations of the head, especially of the vertex, are far more *frequent* than those of the pelvic extremity of the ellipse. When speaking of the attitude of the *fœtus* in utero, the causes why the head should be dependent were examined, and the general conclusion, then arrived at, was primarily the greater specific gravity of the head, and the conical form of the uterus; the limbs of the child being better accommodated at the upper or wider portion of the uterus than at the lower. But whatever may be the true cause, the fact of the greater frequency of cephalic as compared with pelvic presentations is universally acknowledged. Numerous statistical reports have been presented upon this subject, drawn up with more or less care: it is sufficient for our purpose to state that the proportion is generally about ninety-five per cent.

It is also acknowledged that of cephalic presentations a very large number are vertical; but the exact proportion it is impossible to learn, as most authors describe all cranial presentations under the denomination of vertical or occipital.

Presentations of the occiput are not only the most frequent, but also the most *favorable*, as compared with those of the pelvis. This arises from various circumstances, which will be better understood by the student when he has mastered the details of the process in each variety of natural labor. It may now be observed that an occipital presentation is more favorable, inasmuch as

Fig. 39

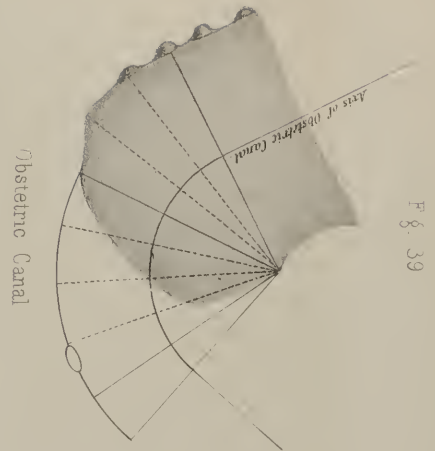
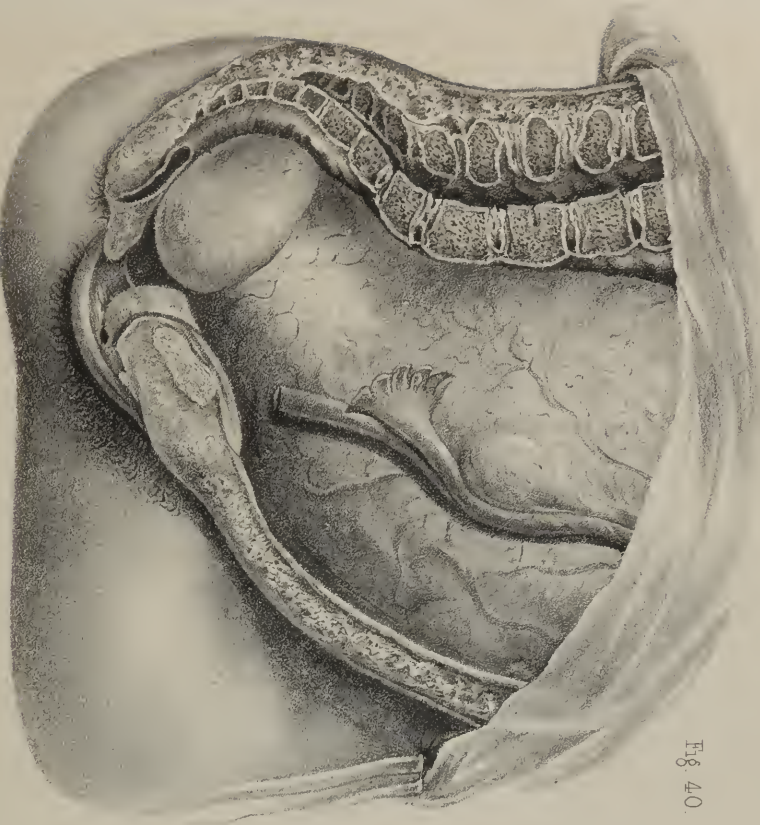
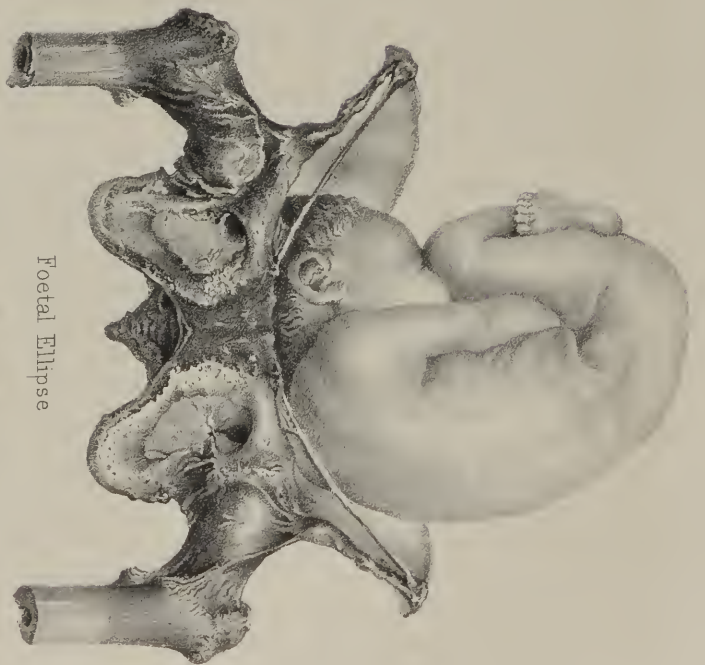


Fig. 40



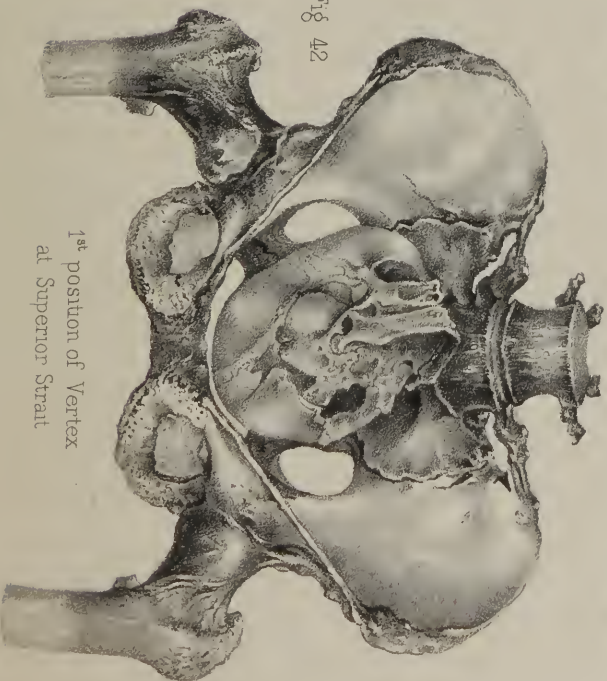
Bag of Waters

Fig. 41

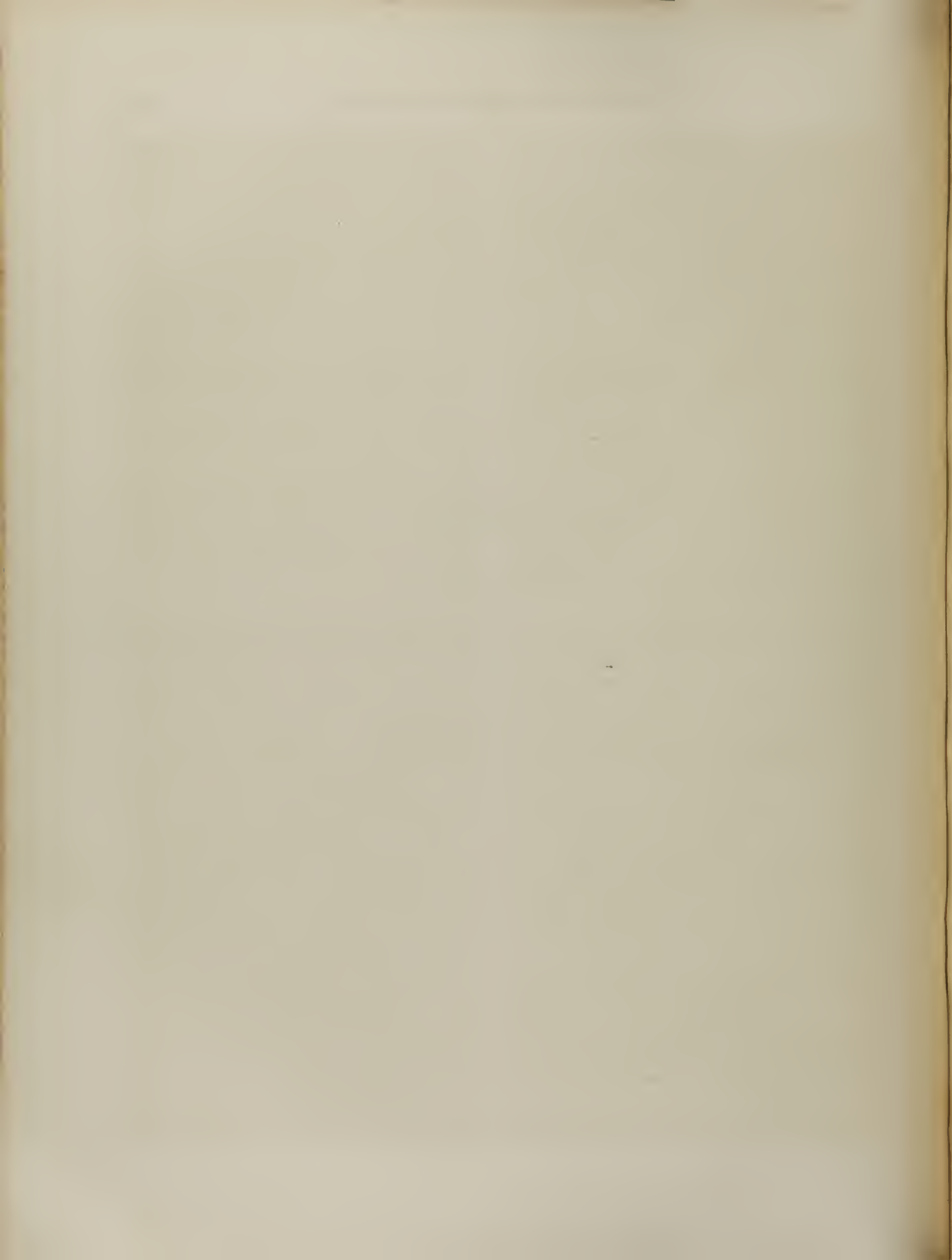


Foetal Ellipse

Fig. 42



1st position of Vertex
at Superior Strait



first, the head being comparatively large, it so dilates the os uteri and vagina, that there is no subsequent delay in the delivery of the body. Second, that great pressure may be endured for a long time upon the head with comparative impunity, because the placental functions are continued; while in pelvic presentations these functions may be suspended from pressure on the cord or placenta, and also from the detachment of this body before the head can be delivered. Third. In vertical presentations the short diameters of the head are concerned, and the more powerful the contractions the more accurately do these diameters correspond to favorable diameters of the pelvis. In pelvic presentations, even if short diameters were originally concerned, alterations of the presentation, and, of course, changes in the diameters, not unfrequently ensue. Fourth. It will be seen that the expulsive powers operate more directly and efficiently in vertical presentations than in pelvic deliveries.

It has already been intimated that in every labor we have to regard not simply the "presentation," but the "position of the presentation;" in other words, the various relative postures which the child may occupy in the uterus, and yet the presentation remain unaltered. We will speak, therefore, of different positions of a vertex or posterior fontanel presentation.

It is manifest that these positions may be indefinitely multiplied, as the occiput or spine of the child may be located anteriorly or posteriorly, or toward the sides of the uterus. The superior strait may be regarded as a circle, and the occiput of the child as being opposed to any point in the circumference, varying therefore in different labors, and sometimes even in the same labor. Authors, therefore, have differed as to the number of positions in which the child may be placed in vertex presentations. Some, as Rigby, limit them to two, as when the occiput or spine may be at the left or right of the pelvis: others, as Nægèlè and most of the German authorities, have adopted four; Solayres, Baudelocque and his numerous disciples in France and America, have taken six; while Moreau and Gardien have described eight positions of the vertex as important.

Considering the subject in a practical point of view, the author would adopt the six positions of Baudelocque; for, although the third and sixth positions are very infrequent, yet they have been met with, especially at the commencement of labor, and may give rise to delays and difficulties which ought to be fully understood by the educated obstetrician, that they may be prevented or relieved.

In three of these *six positions* of a vertex presentation, the occiput and, of course, the back of the child,

will be found toward the anterior part of the pelvis, and in the remaining three the occiput will be posterior. Hence we speak of the *occipito-anterior* and the *occipito-posterior* positions of the vertex. As a general observation, the occipito-anterior positions are most frequent. This has been attributed to various causes; the most influential probably depend upon the general form of the cavity of the abdomen when distended by the uterus "at term;" the thorax and the pelvis giving greater breadth comparatively posteriorly, while the parietes of the abdomen anteriorly are more convex and somewhat contracted, influencing, to some extent, the form of the uterus. Hence the limbs of the child can be better accommodated posteriorly, while the back of the child will necessarily tend in the opposite direction, where, also, its curvature will correspond more readily to the greater convexity of the anterior walls of the uterus and abdomen. Velpeau and others attribute these anterior positions to the greater weight of the spine of the child, inclining it forward, especially when the woman is in the sitting or standing posture.

The occipito-anterior is subdivided into three others, according as the occiput is directly anterior or to the right or left side.

LEFT OCCIPITO-ANTERIOR POSITION.—This first position of Baudelocque (Plate V., Figs. 41 and 42) is, that in which the occiput is opposite the left acetabulum, or, more correctly, to a point in the linea ilio-pectinea opposite to the left acetabulum. It will be found most frequently, at the commencement of labor, that the occiput is opposite to the pectineal eminence; that is, at the point where the linea pectinea joins the linea ilia, and corresponds to the anterior portion of the great cotyloid cavity. Nevertheless, the first position must be by no means restricted to a particular point in the linea ilio-pectinea, but embraces all those positions extending from the spinous process of the pubis, not only to the middle portion of the linea ilia, but even beyond it. Hence, not only all the oblique positions of the child's head toward the left anterior segment of the superior strait, but the transverse positions, and even some of those where the occiput has reference to a part of the left posterior segment, as will be hereafter shown more particularly, must be regarded, in practice, as belonging to the first position.

The reasons why this arrangement should be adopted will be apparent in the sequel. In designating the positions of the vertex, therefore, it would be more correct to refer to the inclined planes of the pelvis than to the mere points usually mentioned by authors. Thus, in the first position of the vertex, or the left occipito-anterior position, we should say the occiput is toward

the left anterior inclined plane of the pelvis and the os frontis toward the right posterior inclined plane, inasmuch as the mechanism of labor is virtually the same whether the occiput strikes anteriorly near the body of the pubis, or posteriorly near the sacro-iliac symphysis. If, however, the occiput strikes on the left posterior inclined plane, as it does in the left occipito-posterior position, (fifth, of Baudelocque,) the descent of the head will be very different from that of the occipito-anterior position. Similar observations may be made of the second and fourth positions of Baudelocque.

This first position of the vertex is far more frequent (according to Madame Boivin about seventy-six per cent.) than the second. This has been attributed to different causes, especially to the condition of the rectum, running, as it does, on the left side of the middle line of the sacrum, its distension with fæces giving a posterior direction to the forehead on the right side, and an anterior to the occiput, on the left.

The position of the rectum, however, in the pelvis cannot possibly influence the position of the child in utero after the fourth month of utero-gestation, when this organ is above the superior strait. It is equally clear, however, that the commencement of the rectum, or, perhaps more correctly, the termination of the colon, as it passes over the ala of the sacrum, on the left of its promontory, must, from its constant and frequent distension by gaseous or feculent matters, determine the head of the child frequently from the left toward the right side. This determination is enhanced by the fact, that the sigmoid flexure of the colon, also generally distended, occupies much of the left iliac fossa, far more in proportion than the cæcum occupies of the right iliac fossa. Hence, as the small intestines are elevated by the enlarged uterus, there is much more room for the accommodation of the forehead and face of the child on the right than on the left side. This seems a reason fully sufficient to explain the greater frequency of the first over the second position of the vertex.

The first position is not only more frequent, but also more *favorable* than either of the other positions of the vertex, not even excepting the second, which will be very evident after studying the mechanism of labor in all the positions of the vertex.

Before labor has commenced, some general idea can be entertained of the presentation by a careful external and internal examination.

Externally, the uterus will be found of an ovoid form, if either extremity of the foetal ellipse present. If, however, it be a transverse presentation, the uterus will be unusually long from one side to the other. By auscultation, also, it can be ascertained

whether the sounds of the foetal heart be toward the upper or lower part of the uterus; if the latter, we may infer a cephalic presentation. Moreover, should the limbs of the child be recognized anteriorly it will probably be an occipito-posterior position; if, however, the motions of the child be felt chiefly posteriorly, and to the right, the inference may be that it is a first position of the vertex: or, if it be felt posteriorly, and to the left, it will be a second position of the vertex.

Internally, per vaginam, if it be a cephalic presentation, the lower part of the uterus will be rounded and prominent, especially between the pubis and the os uteri. The prominence has, sometimes, been called the "uterine tumor," the head being felt through the parietes of the uterus. If, on the contrary, this tumor be absent, and the lower part of the uterus more conical, it is probable that the pelvis, or some other portion of the body of the child presents.

No certainty, however, in diagnosis can be obtained until the os uteri is partially opened, so as to admit readily a finger to the presenting part; then it is not difficult, usually, to distinguish the head, from its size, firmness, and by recognizing the bones of the cranium. When the os uteri is more dilated, the diagnosis can very generally be established by the experienced accoucheur, after a careful examination of the surface of the bones, of the sutures, and especially of the fontanels.

It is very important to establish a diagnosis as early as possible before the membranes are ruptured, or immediately afterward, and while the head is still movable, as, if any correction be necessary, it can be made at the proper time, with much greater facility.

In the first position of a vertex presentation, the finger, on being passed to the anterior portion of the os uteri, usually comes in contact with the posterior superior angle of the parietal bone, and detects the right branch of the lambdoidal suture. On tracing it upward, it comes in contact with the mastoid process of the temporal bone, which can generally be readily recognized. Following the lambdoidal suture, however, downward and backward, the finger will arrive at the posterior triangular fontanel, which will be detected by its small size, its form, and the three sutures diverging from its angles. In our experience, the posterior fontanel is very generally absent. The practitioner, however, will observe that the parietal bones overlap the os occipitis. Hence, the posterior margins of the parietal bones, as formed by the lambdoidal suture, are prominent, the more so if the head be compressed. These margins meet, forming an angle easily recognized, from which may be traced the two branches of the lambdoidal suture, and also

the sagittal suture. These are the characteristic points of the region of the posterior fontanel, or vertex.

The diagnosis may be confirmed by passing the finger to the left over the occipital protuberance, and to the right and anterior over the right parietal protuberance; and, still more satisfactorily, by following the sagittal suture, backward and to the right, when, very generally, the anterior fontanel will be detected by its large size, its four sides and angles, and four sutures proceeding from its angles. To complete the diagnosis the practitioner should determine that the posterior fontanel is somewhat *lower*, that is, nearer to the coccygeal region than the anterior fontanel, as otherwise it will be not strictly a vertex presentation, but one of the anterior fontanel. These points being made out satisfactorily, no doubt need exist as to its being a vertex presentation in the first position, when, of course, the whole position of the child, as regards the pelvis and the uterus, will be patent to the mind of the practitioner.

Diagnosis in obstetrics is, however, always difficult; and there are but few practitioners, who will not acknowledge that they have often been mistaken, and that, in many instances, a correct diagnosis has been impossible. Great care and attention, therefore, should always be exercised; more especially should the practitioner make himself familiar with the fontanels and sutures, for so far as cranial presentations are concerned, it is almost entirely by them that the presentation and the position can be recognized. Practice here, as under other circumstances, will make expert. Of course, there can be no objections, if it can be safely done, to extend the finger around the different portions of the head, and especially to the pubic side and ear of the child. Until of late years, the British practitioners seem to have depended almost exclusively on feeling the ear, in order to determine the position of the head. The ear being reached, its relation to the sides of the pelvis can be determined, and also, by feeling its loose margin or helix, we can ascertain the direction of the occiput, and thus the position of the whole head. Any knowledge that can be thus obtained will be satisfactory, especially in cases of doubtful diagnosis: but the value of this measure is, after all, of very trifling importance; because at the beginning of a labor, even after the membranes are ruptured, the ear can seldom be felt, and the attempt gives rise to much pain and irritation. This is the period, also, in which it is all important to make the diagnosis. Indeed, in many cases, where the head is arrested at the superior strait, from any cause, and where artificial delivery is demanded, the diagnosis must be established, if at all, by means of the sutures and fontanels. When the head

is lower down in the pelvis, the ear may be felt; generally, however, by inflicting pain on the patient. But, by this time, the presentation and position of the head are generally evident even to practitioners of moderate experience.

As preliminary to a minute examination of the details of labor, it may be remarked, that we shall regard the process as occurring in *primiparous* women, where there is usually great resistance from the tonicity and contractility of the tissues, and, of course, much difficulty. In *multiparous* women, the parts are relaxed; hence, the child descends rapidly and easily, and all the phenomena, illustrating the details of the process, are not always to be observed.

It will, also, be taken for granted that the full period of utero-gestation has been attained, and that the natural relative proportions between the size of the head and the canal of the pelvis exist; for premature children being smaller, are delivered with comparative facility, and often without being subjected to those changes, as flexion, extension, etc., necessary in fœtuses more fully developed.

Let it be also observed, that in every delivery the child has virtually to pass through *four openings*, two having respect to the bones, and two to the soft parts; in other words, it has to pass through the superior strait of the pelvis, then through the os uteri, afterward through the inferior strait, and, finally, through the os vaginæ.

Moreover, in all cases of natural labor, whether in cephalic or pelvic presentations, there is little or no resistance at the superior strait of the pelvis, inasmuch as the diameters of the presenting parts are small, compared to the diameters at the brim of the pelvis; even the third and sixth positions will hardly form an exception to this remark.

It will be taken for granted that the first stage of labor, or the dilatation of the os uteri, is complete, and the bag of waters is unbroken; of course, therefore, the mechanism of labor has respect merely to the *second stage* of the process—the stage of expulsion.

This stage may be advantageously divided into *five periods*: the first, embracing the passage of the head through the superior strait and os uteri; second, the descent through the canal of the pelvis to its outlet; third, its passage through the inferior strait; fourth, through the os vaginæ; and, fifth, the delivery of the body of the child in cephalic presentations, or the delivery of the head in pelvic presentations. The necessity and advantages of this division will soon be apparent.

The learned reader will immediately perceive that this subdivision of this second stage of labor differs ma-

terially from that laid down by the best authorities. Cazeaux, for example, speaks of five periods: one of flexion, another of descent, a third of rotation, a fourth of extension, and a fifth of external rotation; and he may be regarded as representing the Continental authorities upon this point. We think, however, that a careful examination of the delivery of the child will indicate that the important changes of flexion, rotation, etc., are incidents, referable to changes in the condition of the child, which may or may not occur, but do not indicate either the time or the place in which such changes are observed; of course, they do not indicate the different periods of the second stage. For example, the period of flexion, so called, is usually at the orifice of the uterus in the first position of the vertex; but this is not always the case: if the os uteri be much relaxed, flexion may not occur until the head reaches the inferior strait, or perhaps not at all. In presentations of the top of the head, there is sometimes no flexion whatever; so also, in presentations of the face, the child's head is in a state of extension until the chin appears under the pubis. The same is true of the process of rotation. In the third and sixth positions of Baudelocque, no rotation is observed. Occasionally, when the head enters obliquely the superior strait, it passes obliquely through the cavity of the pelvis, the inferior strait, and even the os vaginæ, with little or no perceptible rotation, if the head be small, and the parts relaxed. We have even known the head in a transverse position, at the superior strait, delivered transversely at the inferior strait; of course, without rotation. As regards extension, in the occipito-posterior positions, where the occiput is delivered posteriorly, flexion is continually augmenting until the occiput is delivered; there is no extension, in these cases, until the head is passing through the os vaginæ.

Moreover, the so-called periods of flexion, rotation, etc., are continually interfering with each other. It will be presently seen that very incorrect ideas are given to the student by this artificial arrangement, for by it he is taught that flexion occurs invariably at one time, rotation at another, extension at another, and so on; but at the bed-side, it will often be found that rotation occurs without flexion, that extension begins before rotation is completed, and that very generally, even in the most natural labors, rotation and extension progress, *pari passu*, so that strictly speaking, the two periods will be confounded.

The author's division is founded upon an entire different principle, having reference, not to the changes which take place in the child, but to those portions of the mother's tissues where delays may, and usually do occur, especially in primiparous labors, viz., at the os

uteri, canal of the vagina, inferior strait, and os vaginæ. No distinction is drawn between the orifice of the uterus and superior strait, inasmuch as the superior strait seldom offers any resistance in normal parturition, and the delay, therefore, is at the os uteri; but if there be any delay at the superior strait, the passage of the head is generally simultaneous through the brim of the pelvis and the orifice of the uterus. A fifth stage is added, for the delivery of the body of the child after the head has passed, in cephalic presentations; or, in cases of pelvic presentations, for the delivery of the head, after the body has passed.

First Period of Second Stage.—The os uteri being fully dilated, and the head presenting in the first position of the vertex, an external examination indicates that the upper part of the abdomen is less distended than before—that the uterine tumor, although not much diminished in size, is dense and firm, and on every accession of pain, becomes very hard and rigid, while the fundus “rises up” and becomes more prominent toward the umbilicus. On a careful examination internally, if made during a pain, the hemispherical bag of waters is usually found protruding through the os uteri, very tense and firm. (Plate V., Fig. 40.) As soon as the pain has subsided, the bag recedes to a very great degree, the membranes collapse, and it is easy then to feel, through the membranes, the head of the child. The experienced practitioner will recognize (Plate IV., Fig. 25) the right branch of the lambdoidal suture behind the body of the pubis, and somewhat to the left side; tracing this branch, he will be directed to the posterior fontanel, which will be found toward the left of the pelvis, and slightly anterior to the transverse diameter. The finger then may trace the sagittal suture to the anterior fontanel, which will be found to the right side of the central portion, and somewhat posterior to the middle line. He will also notice that this anterior fontanel is a little higher than the posterior, the latter being nearer to the floor of the pelvis. Very universally, the middle of the sagittal suture (which corresponds to the anterior margin of the vertex, as formerly described) will be found at the centre of the superior strait, and, of course, opposite to the os coccygis; the right parietal protuberance will be recognized as being opposed to the right or horizontal ramus of the pubis; the left parietal protuberance cannot now be felt, but, of course, will be opposed to the left sacro-iliac symphysis. The occipital protuberance will be opposite the pectineal eminence of the left side, and the bi-frontal suture will be opposed to the right sacro-iliac symphysis.

It results from these facts:

First. That the head is situated obliquely at the su-

perior strait of the pelvis, corresponding to its left oblique diameter.

Second. That the lowest part of the child's head nearest to the centre of the pelvis is the anterior part of the vertex or middle of the sagittal suture. This fact we conceive to be of importance, as long ago stated by Burns, Velpeau, etc., although it has been disputed by many obstetricians.

Third. That the head at this time is in a state of demi-flexion. (Fig. 33, on page 137.) This fact has been theoretically acknowledged almost universally by obstetric authors, who continually speak of the child's head, at the latter periods of gestation, and during the first part of labor, as being flexed. Nevertheless, with much inconsistency, they describe the head of the child as presenting the occiput to the acetabulum, and the forehead to the right sacro-iliac symphysis, and the anterior fontanel as being upon a level with the posterior fontanel; hence, they say that the occipito-frontal diameter is parallel with the left oblique diameter of the superior strait, and therefore, as M. Cazeaux would express it, the occipito-frontal circumference corresponds to that of the superior strait, and the cervicobregmatic diameter corresponds to the axis of the strait.

On a little reflection, the practitioner, holding a foetal cranium in his hand, will be convinced of the great inaccuracy of this assertion. If the occipito-frontal diameter coincides with the left oblique, there can be no flexion of the head; the head will be found at right angles to the spine. But this is not the case: the head is in a state of demi-flexion; it is the top of the os frontis, as represented by the bi-frontal suture, which is at the right sacro-iliac symphysis; the forehead, as well as the face, is above this symphysis; the anterior fontanel is not on the same level with the posterior, but the latter is nearer to the floor of the pelvis. The real diameter, therefore, of the head, which corresponds to the left oblique, will be one drawn from the occipital protuberance to the middle of the bi-frontal suture.

Under these circumstances, the contractions of the uterus become more powerful; the bag of waters is ruptured, and the liquor amnii, in whole or in part, is discharged; the whole force of the contractions of the uterus, in every direction, are now impressed upon the body of the child. The first effect of these powerful contractions, operating, as they do, not only from above downward, but also anteriorly and posteriorly, and from one side to the other, is to augment and perfect the elliptical form of the child: the spine becomes more bent, the pelvis approximates to the head, the limbs are closely gathered toward the chest and abdomen, while the chin of the child approaches the breast; in

other words, general flexion immediately takes place. The demi-flexion of the head is now converted into complete flexion, the chin being in near contact with the sternum of the child. (Plate V., Fig. 41, also Plate XVIII., Fig. 99.)

Now, if an examination be made per vaginam, the bag of waters cannot be found; the head of the child will be detected occupying the os uteri, the edges of which will be near to the occipital protuberance behind, and anteriorly toward the frontal portion of the anterior fontanel. The middle of the sagittal suture is no longer at the centre of the pelvis; the posterior part of this suture, or if the resistance at the os uteri be considerable, the posterior fontanel, will be found toward the centre of the os, and opposite the coccygeal region of the pelvis. The degree of flexion, however, will vary according to the resistance given at the orifice of the uterus to the descent of the head; for the greater the resistance, the more effectually will the os frontis be retained upon the margin of the os uteri, and consequently the occiput will descend, and the posterior fontanel will approximate nearer and nearer toward the centre of the pelvis, while the anterior fontanel will be found much more elevated, sometimes within the circle of the os uteri. Velpeau confirms this assertion, declaring that prior to the rupture of the membranes, the middle of the sagittal suture presents at the os uteri, but afterward there is a constant tendency of the posterior fontanel to the centre of the pelvis. This has been technically called "*flexion*," but should be regarded simply as an increase of flexion, the head being partially flexed before the rupture of the membranes.

Let it now be observed that the body of the child, being closely embraced by the uterus, has the vertex at the orifice, and the pelvis at the fundus of the uterus; therefore the cephalo-coccygeal, or long diameter of the foetal ellipse, is coincident with the axis of the uterus; also, that the liquor amnii being evacuated, the whole size of the uterus is so diminished, that its long axis is now coincident with the axis of the superior strait of the pelvis. Hence, the body of the child is pushed downward by the conjoint action of the uterine forces, and those of the abdominal muscles and diaphragm, in the direction of the axis of the superior strait.

The forces thus applied to the child's body are impressed upon its head, through the medium of the spine, and therefore when the head is partially or completely flexed, the direction of this force will be toward the superior and posterior portions of the head. Hence, the occipital region will be driven down first, thus increasing the flexion of the head in proportion to the degree of resistance which is presented to its passage.

The head at this time may be regarded as a "lever of the third kind;" the uterine force operating through the spine on the head of the child in the direction of its vertex. Hence, the short arm of the lever, from the spine to the occiput, is forced to descend, while the long arm, from the spine to the chin, ascends. On this account vertex presentations are always *persistent*,—the more powerful the contractions of the uterus, and the greater the resistance, the more complete will be the flexion.

In this first position, therefore, of the vertex, after the flexion has been perfected, it is strictly correct to say that the nape of the neck, or the sub-occipital region, is opposite to the left acetabulum, and the anterior fontanel to the right sacro-iliac symphysis; while the right parietal protuberance is to the right acetabulum and the left to the left sacro-iliac symphysis; the vertex or posterior fontanel is opposite to the coccygeal region, and the chin of the child points to the fundus of the uterus. Hence, the occipito-mental diameter of the head is coincident with the axis of the uterus, and, of course, with the axis of the superior strait of the pelvis; the cervico-bregmatic diameter is parallel to the left oblique, and the bi-parietal diameter is parallel to the right oblique; and, of course, the cervico-bregmatic circumference of the child's head corresponds to the circumference of the superior strait and to that of the os uteri. Hence, it is correct language to say that the child's head enters perpendicularly to the plane of the superior strait—the cervico-bregmatic plane of the head (Plate IV., Fig. 26) being parallel to the plane of the superior strait, (Plate II., Fig. 8,) and the occipito-mental diameter being perpendicular to this plane. What is thus true of the relation of the child's head to the superior strait is equally true as respects the orifice of the uterus: the head passes perpendicularly through the os uteri.

This, we contend, is true whenever there is much delay or resistance, as is usually found in primiparous patients; if, however, as often occurs in multiparous women, the os uteri should be much relaxed, the head will pass, very readily, in a state not of complete flexion, but of demi-flexion, presenting large diameters: but just in proportion to the resistance is the degree of flexion; and whenever flexion is perfected, we have the short diameters of the head concerned.

It is in this way, most assuredly, that the child's head is driven, in the easiest manner, through the various openings and passages of the pelvis. This is abundantly confirmed by careful observation.

The views which we have thus presented are virtually the same as those detailed in the best obstetric authors, past and present, with the exception of M. Nægèlè, the

distinguished Professor of Heidelberg, and those gentlemen in Great Britain as well as on the Continent, who have adopted, with or without careful examination, the teachings of the German Professor.

M. Nægèlè contends that the head does not pass through the superior strait in the manner just represented, but insists that the bi-parietal diameter is not parallel to the right oblique; that the right parietal descends first below the linea ilio-pectinea, and the left boss subsequently; so that there is a lateral inclination of the head as it passes the superior strait. Hence, he observes that it is not the middle of the sagittal suture, but the superior and posterior part of the parietal bone, or very frequently even the parietal protuberance, which descends first in vertex presentations. There are chiefly two facts upon which he relies to substantiate his opinion, neither of which we can regard as tenable.

The first is, that upon making an examination per vaginam the first part of the child's head that is felt, as the finger enters, is the parietal boss, or the posterior portion of the parietal bone; this being nearest to the orifice of the vagina. This is undoubtedly true, but should this portion of the head be regarded as the presenting portion? Certainly not; for at this period of labor the head is high up toward the brim; it has to descend some three or four inches until it rests upon the floor of the pelvis, before delivery can take place; and the parietal boss, therefore, has to descend nearly as low as the tuber of the ischium before it passes; while, in the mean time, the whole head has to change its position, and this boss, from the beginning to the end of the process, cannot be recognized toward the centre of the pelvis; but is always either toward its anterior or lateral portion.

As the posterior or left parietal protuberance cannot now be felt, it is hypothetical to affirm that it is higher than the anterior, because the anterior can be so readily felt toward the pubis. On the contrary, as in these cases, the sagittal suture, as it traverses the pelvis obliquely from left to right, will be found opposite to the coccyx, it is fair to presume that while one parietal protuberance is toward the linea pectinea on the right, the other is on a level with the linea ilia on the left side; for it will be found by experiment that if the right parietal protuberance is made to pass below the superior strait sooner than the left, the sagittal suture would be proportionally directed more and more toward the posterior part of the pelvis, which, according to our observation during labor, is not true.

We think the whole of this mistake, as we must consider it, has arisen from the almost universal practice of regarding the os vaginæ as the bottom of the pelvis, while, in reality it is situated, as was formerly demon-

strated, on its anterior portion. The coccygeal region is the real bottom or floor of the pelvis, being opposite to the centre of the superior strait, and upon which, therefore, terminates the axis of this strait. The child, therefore, as we shall presently show, has to descend almost in a straight line until it reaches the floor of the pelvis, and then has to ascend on the plane of the perineum toward its anterior position, as constituted chiefly by the arch of the pubis. We think this perfectly demonstrated by the fact that the perpendicular depth of the pelvis posteriorly is at least five inches, while anteriorly, so far as the bones are concerned, it is but one inch and a half. Hence, the foetus does not pass in a straight direction through the cavity of the pelvis and vagina, but must describe a curved line. Hence, also, we think that it is very erroneous to describe that part of the head which is first felt at the arch of the pubis as being the presenting part. The "presentation" is that which corresponds to the centre of the pelvis. The second fact upon which M. Nægèlè relies, is the position of the caput succedaneum, or tumor of the scalp, which is usually found toward the posterior superior portion of the right parietal bone; this, he thinks, proves the obliquity of the head at the superior strait, as regards its bi-parietal diameter.

This swelling of the scalp, it is well known, arises from the interruption of the circulation incident to delays in labor. That portion of the head directly opposite to any of the openings of the pelvis, being unsupported, may swell; the pressure upon the surrounding parts of the scalp being so great as to interrupt the venous circulation. Hence, the argument appears plausible, that as the parietal bone at the superior and posterior part is usually covered by the tumor, that this is the true presenting part at the superior strait.

There can be no doubt whatever that in most cases of the first position of the vertex the tumor of the scalp is found on the right portion of the vertex, corresponding to the upper and posterior angle of the parietal bone. We believe, however, that this swelling is very seldom formed at the superior strait of the pelvis, or at the orifice of the uterus, but near the inferior strait, as we shall presently show. When, however, the os uteri is but partially dilated and rigid, the liquor amnii evacuated, and the contractions of the uterus powerful, the caput succedaneum which is then formed is nearer the sagittal suture, and sometimes directly over it, as M. Cazeaux observes, and the detention be very long, the whole region of the posterior fontanel is occupied with the swelling. In many instances of this kind, the presentation has to be recognized not by the posterior fontanel, which is completely obscured, but by feeling for the anterior fontanel and other portions of the

head. It is true, however, that even at the os uteri this swelling is usually rather more upon the right than on the left side of the sagittal suture. This we think dependent, not upon the obliquity of the head, as insisted upon by M. Nægèlè, but upon the fact that in these cases, owing to the strong bearing-down efforts of the patient, the fundus of the uterus is pushed so far forward, that somewhat of an anterior obliquity is given to the organ for a short time. Hence the undilated orifice of the uterus is turned toward the sacrum; and thus in some instances a slight lateral obliquity will be given to the head of the child.

M. Nægèlè not only insists that the head enters obliquely, as regards its bi-parietal diameter, but also contends that this inclination is of great practical importance; that a shorter diameter is thus presented than that of the bi-parietal. The difference, however, is very trifling; probably never more than three or four lines, which certainly is of no importance when we bear in mind that the right oblique diameter of the superior strait measures five inches, and the bi-parietal only three inches and a half. Even as regards the os uteri, our observation does not confirm the proposition of the Professor, for we find that here and elsewhere, whenever the resistance is great, the more exact is the parallelism between the bi-parietal and the cervico-bregmatic diameters, on the one hand, and the diameters of the orifice through which they pass, on the other. In other words, the head passes more easily, the more complete its flexion, and the more perfect the parallelism of the cervico-bregmatic circumference of the head with that of the superior strait, or that of the orifice of the uterus.

In this opinion we are pleased, among modern authors, to have the support of so scientific and judicious a practitioner as M. Cazeaux, who dissents from Professor Nægèlè respecting the lateral obliquity of the head as regards the superior strait of the pelvis.

The first period of this second stage of labor may be considered as terminating as soon as the orifice of the uterus is dilated sufficiently to admit the transit of the occipital extremity of the head; usually, it must measure three and a half inches in its diameters. Under these circumstances the edges of the os uteri will be observed to glide first over the occipital protuberance to the nape of the neck, and then over the parietal protuberances laterally, and rapidly over the os frontis and face of the child.

Second Period of the Second Stage.—This embraces the descent of the head through the pelvis, from the superior strait, or os uteri, to the inferior strait.

The head, being liberated from the os uteri, generally descends rapidly until the sinciput strikes the floor of

the pelvis; but in primiparous patients there is more or less delay as it approximates the inferior strait. The first fact to be observed is that the head now returns to a state of demi-flexion; being liberated from the great pressure of the cervix uteri, it has passed into a larger space. Hence, the occipital protuberance, instead of being pressed toward the centre of the pelvis, strikes against its left anterior inclined plane. Of course, the posterior fontanel is again to the anterior and left of the centre, while the sagittal suture is opposed to the coccyx, and the anterior fontanel to the right sacro-sciatic foramen. The right parietal protuberance is now lower toward the right crus of the pubis, and the left protuberance toward the left sacro-sciatic foramen; the head is in the cavity of the pelvis, (Plate VI., Fig. 43, also Plate XVII., Fig. 98,) being situated obliquely between the superior and inferior straits. Being still forced onward by the contractions of the uterus, operating through the spine, the occipital protuberance and the left side of the vertex now impinge forcibly on the left anterior inclined plane of the pelvis, thus necessitating the gradual passage of the occiput from behind forward, from the foramen thyroideum toward the ramus of the ischium. This implies a corresponding movement of the os frontis in an opposite direction from before backward toward the sacrum. This is the commencement of that second important change in the position of the head termed "*rotation*;" the processes of descent and rotation are therefore simultaneously executed.

The head continuing to descend, now begins to press upon the os coccygis and the perineum, in an oblique direction; both of these tissues yield—the os coccygis recedes, while the perineum is distended—and the distension is greater at this time upon the left lateral portion of the perineum. The rotation of the head continues to increase, under the influence of the left inclined plane, not simply as formed by the bones, but as continued by the left levator ani muscle and the other soft parts of the perineum, until very soon the point of the occiput is felt underneath the left ramus of the ischium, and, of course, covered by the left side of the perineum. The occiput, as it gradually approximates the middle line of the perineum, is observed to rise nearer and nearer to the symphysis pubis, being liberated from the pressure to which it was exposed against the bones of the pelvis and the perineum. It will now be felt at the orifice of the vagina, and by the time rotation is complete, the occipital protuberance is toward the centre of the orifice, and the sub-occipital region of the head will be found under the symphysis pubis; the point of the occiput has thus risen from the lower to the upper portion of the arch of the pubis. This

change in the position of the occiput, of course, necessitates a similar change in the position of the os frontis. As the os occipitis rotates under the arch of the pubis, the forehead turns toward the sacrum, and as the os occipitis rises up toward the orifice of the vagina, the chin of the child leaves the breast; in other words, another change in the position of the head commences, namely, "*extension*." This beginning of the process of extension very universally ensues before rotation is complete. Hence, descent, rotation, and extension are progressing at the same time, until the rotatory movement is perfected; then the head is fairly engaged in the inferior strait, and the second period of labor, or passage through the pelvis, may be considered as terminated.

In primiparous patients, this is often a very tedious process; and owing to the rigidity of the tissues, and the pertinacity with which the muscles of the perineum contract, much pain, lasting for many hours, is often experienced.

During this second period, a few important facts should be noticed:—

First. The head describes, during this descent, a spiral movement, to a greater or less extent, according to the original position of the occipital protuberance. When this was originally opposed to the ramus of the pubis, the movement was not extensive, probably not more than one-eighth of a circle. When, however, the occiput is opposed to the plane of the ischium, it will describe at least one-fourth of a circle during the rotatory movement from the side to the anterior portion of the pelvis. As the head descends, during the process of rotation, the line thus described by the occiput is not that of an arc of a simple circle, but rather the oblique curved line of the "thread" of a screw. This, of course, is true of other portions of the head. The forehead of the child revolves from the right to the left posteriorly, while the left parietal protuberance has a similar oblique rotatory motion from the left sacro-iliac symphysis anteriorly toward the left ramus of the ischium; and the right parietal protuberance, during its descent from the superior to the inferior strait, describes a curved line from the horizontal ramus of the pubis to the right tuber of the ischium: the extent of this curve is, of course, very trifling, compared to that described by the left parietal protuberance. Hence, with some limitations, the head may be said to be screwed or twisted through the pelvis; it rotates on its occipito-mental diameter.

Second. During this process of rotation, the obliquity of the shoulders, which existed at the commencement of labor, is usually maintained; hence, as the occiput rotates forward, and the face backward, there is, of

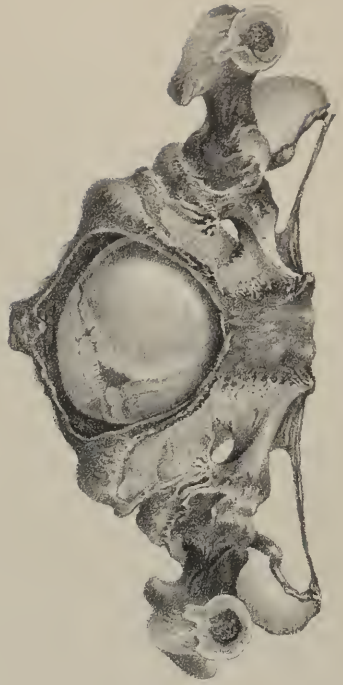


Fig. 43.

1st position of Vertex
in Cavity of Pelvis

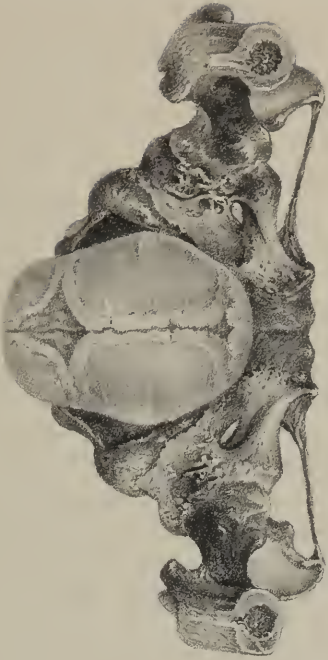


Fig. 45.

at orifice of Vagina.



Fig. 44

at Inferior Strait.



Fig. 46.

Head delivered.

necessity, a twist in the neck of the child, often to the eighth, and, no doubt, frequently, to a quarter of a circle. (Plate XVIII., Fig. 100.)

Third. As the head descends through the pelvis, it passes successively through its different planes. These planes, as formerly remarked, are very nearly parallel to each other, until we come to the top of the arch of the pubis; then they become more and more oblique, till we reach the plane of the inferior strait. (Plate III., Fig. 18.) We say, therefore, that the head, descending perpendicularly to each of these planes, moves nearly in a direct line, corresponding to the axis of the superior strait, till it reaches the floor of the pelvis, when, as already mentioned, the occiput gets under the arch of the pubis, and the process of extension commences, so that the head still passes, perpendicularly, to the planes of the inferior portion of the pelvis. As, however, during the latter portion of this process the head has not completed its rotation, the careful observer will notice a little lateral curvature of the neck, so as to allow the head to descend corresponding to the curved line of the axis of the pelvis; and as the posterior parietal protuberance descends, comparatively, more rapidly than the anterior, the neck being somewhat convex posteriorly and to the left, and concave anteriorly and to the right, a little lateral flexion, therefore, of the head will exist, until rotation be complete.

This fact will be best illustrated by supposing that the head descended transverse, in a vertex presentation, and did not rotate; then, as it is forced down toward the inferior strait, this lateral movement would evidently be very decided, as the head passes from the superior to the inferior strait. During the descent of the head, therefore, after it escapes the os uteri, there is a constant succession of changes. Complete flexion is succeeded by demi-flexion; this is followed by rotation, and again by the commencement of extension, and also by a lateral flexure of the neck.

Fourth. It has already been intimated that this process of descent is sometimes very tedious, especially in primiparous patients; hence, under powerful contractions of the uterus, the head is often arrested, even for hours, at the inferior part of the pelvis; the occiput being toward the crus of the left ischium, the right parietal protuberance behind the ramus of the pubis, and the bi-parietal suture corresponding to the oblique diameter of the inferior strait. In these cases, the rigid perineum will be found stretching over the top of the head of the child, as far forward as the sagittal suture; while the posterior superior angle of the parietal bone is opposite the os vaginæ, and is, therefore, the only part of the head not subjected to pressure from the surrounding parts.

Hence, it is at this time, and at this spot, that the tumor of the scalp, or the caput succedaneum, is generally formed, which, sometimes, where the delay has been great, has proved to be very enormous.

M. Naegelè would consider this therefore as the presenting part, as it is opposed to the orifice of the vagina. We think, however, very incorrectly; for the head does not, and very seldom can, pass out in this direction: rotation is not complete. The occipital protuberance must be directed upward toward the symphysis pubis, and laterally from the ramus of the ischium toward the middle of the os vaginæ—that is, toward the coccy-pubic diameter—before delivery is accomplished. The true presenting part is still the vertex, or posterior fontanel, which, at this time, is covered with the distended perineum, and is toward the centre of the inferior strait, and to the left, as will be presently shown. The formation, therefore, of the caput succedaneum on the side of the head, we regard as no proof that this is the presenting part. It may be regarded as an accident, arising from the detention of that portion of the head at the orifice of the vagina where the tissues are unsupported, as will be presently demonstrated: it is not the portion of the head which is toward the centre of this part of the pelvis.

Third Period of the Second Stage.—This consists in the transit of the head through the inferior strait of the pelvis. The rigidity of the tissues, and especially the small comparative size of the inferior strait, often render this passage painful, tedious and dangerous. It is here that instrumental assistance is more frequently demanded than under any other circumstances. The practitioner, therefore, should be accurately acquainted with nature's mode of delivery, that he may successfully assist in cases of emergency.

We have already shown that the head approximates the inferior strait in an oblique direction; but when rotation is completed, the base of the occiput is under the sub-pubic ligament. It will now be found that the occipital protuberance projects somewhat through the orifice of the vagina, and the head is still slightly oblique. Under the powerful bearing-down efforts of the mother, the head is driven down, and the occipital protuberance continues to advance through the orifice of the vagina, until the nape of the neck is arrested by the symphysis pubis, by which time the head is nearly or quite engaged within the circle of the inferior strait of the pelvis. (Plate VI., Fig. 44.)

If a careful examination be now instituted, the base of the occiput will be found at the top of the arch of the pubis, the right parietal protuberance near the right tuber ischii, and the left parietal protuberance

toward the left tuber ischii. If the finger be placed in the rectum, the bi-parietal suture will be found corresponding to the middle line of the perineum, and the anterior fontanel opposed to the now extended os coccygis.

It will also be noticed that the posterior commissure of the vulva stretches over the head, very nearly in the direction of the lambdoidal suture, so that the posterior fontanel is found covered by the perineum, and toward the centre of the inferior strait, midway between the tubers of the ischia and also between the symphysis pubis and os coccygis, and is therefore the true "presenting part" of the head at the inferior strait of the pelvis; it follows, therefore, that the forehead and face of the child are turned toward the sacrum, and that the chin points to the upper portion or first bone of the sacrum. (Plate XVII., Fig. 96.)

Hence, it results that by this process of descent, rotation and partial extension, the occipital extremity of the head, which passed perpendicularly through the superior strait, os uteri, and the different planes of the pelvis, has now entered perpendicularly into the circle of the inferior strait—the vertex or occipital foramen presenting at the centre.

Hence, the occipito-mental diameter will be found coincident with the axis of the inferior strait of the pelvis, the bi-parietal parallel to the transverse diameter, and the cervico-bregmatic parallel to the antero-posterior diameter; in other words, the head engages at the inferior precisely as it did at the superior strait with its cervico-bregmatic circumference. At the superior, however, great flexion existed, but at the inferior strait the head is partially extended, being thus accommodated to the obliquity of the inferior plane as compared with that of the superior. As soon as the parietal protuberances pass the rami of the ischia, this period of labor terminates and the fourth commences.

In thus describing the transit of the head through the inferior strait, we find ourselves once more in opposition to the Professor of Heidelberg and his followers. M. Nægelè contends that the rotatory motion of the child's head is never completed until its birth; that the spiral or screw-like motion continues as the head passes the outlet of the pelvis; in other words, that the right parietal protuberance passes the right crus of the ischium before the left passes the left crus. He insists that the head not only passes the superior strait obliquely, as regards its bi-parietal diameter, but that the same also occurs at the inferior strait; and that this inclination or obliquity favors the process of delivery.

No one will pretend to deny that in a large number of cases the head is delivered in the oblique manner, as

represented by M. Nægelè. This mode of delivery is very apt to occur in all cases of premature labors, also whenever the head is unusually small, and especially when the soft parts are greatly relaxed, as in multiparous women. Many such cases we have met with, and, in one instance, no rotation whatever occurred; the head passing with the cervix to the left tuber, and the anterior fontanel to the right tuber. But the question to be decided is, when the head is of the ordinary size, and when the perineum is of the usual rigidity existing in primiparous women, how does it pass? Our attention has been drawn to this question for many years since the opinions of Nægelè were known to us, and we have no hesitation in declaring, in opposition to the well-earned authority of the Heidelberg Professor, that the greater the resistance at the inferior strait, the more perfect will be the rotation and the more exact the parallelism of the plane of the cervico-bregmatic circumference of the child's head with that of the inferior strait: the bi-parietal diameter being coincident with bis-ischiatric of the inferior strait.

We think the mistake, as we consider it, of M. Nægelè has arisen from the fact that he examined the direction of the sagittal suture before the head had fairly entered the strait, and also that he advises this examination to be made during the interval of a pain, instead of *during a pain*, or at the time at which the parietal protuberances actually passed the tubers of the ischia. There is no doubt that before the head is fairly engaged, the direct position of the head, induced by the contractions of the uterus, disappears by the recession which occurs during the interval; the head again becoming oblique. If, however, an examination be made, when the parietal protuberances are opposed to the rami of the ischia, we must believe that when the perineum is rigid, the sagittal suture will be found corresponding to the middle line of the perineum, and the cervico-bregmatic diameter to the coccy-pubal diameter of the strait; and, therefore, that in a mechanical point of view this is the easiest and most natural, and, of course, the best mode by which the occipital extremity of the head can be delivered.

We find that MM. Velpeau and Cazeaux do not sanction the opinions of M. Nægelè, but contend for the parallelism of the cervico-bregmatic circumference, not only with that of the superior, but also with that of the inferior strait of the pelvis, thus adding the weight of their authority against the innovations of the German school, and in support of what had been previously regarded as the settled opinion of the profession.

Fourth Period of the Second Stage.—This embraces the passage of the head through the lower portion of the vagina and its external orifice.

The parietal protuberances, having passed the rami of the ischia, the head, in a mechanical point of view, is liberated from the bones of the pelvis, and its complete delivery is opposed simply by the soft parts. Hence, where there is great relaxation of the perineum and vagina, especially in multiparous patients, or where the orifice of the vagina is very large from injuries sustained in former labors, the transit of the head is very rapid, and sometimes almost instantaneous.

In primiparous patients, however, where there is the usual tonicity of the perineum and of the vagina, the head is resisted for a long time, especially toward the external orifice, rendering repeated bearing-down efforts still necessary, and thus constituting another period of the expulsive stage.

It is well known that, at this time, all the tissues of the perineum become enormously distended, and greatly thinned. This distension is first toward the posterior portion, and a little to the left; then, after the head has passed the inferior strait, distension is very regular from one tuber ischii to the opposite, and from the coccyx toward the anterior perineum. This last portion, including the anterior wall of the rectum and the anus, soon receives the chief impulse from the head, and becomes more and more distended, till, eventually, the orifice of the vagina is gradually dilated, sufficiently to allow the escape of the whole occipital extremity of the head. The distension of the os vaginæ is, of course, chiefly at its lower segment; the resistance of the arch of the pubis effectually preventing any enlargement of the anterior portion. This process of distension and elongation of the vagina and perineum is effected with great suffering to the patient, often with much delay, and not unfrequently with danger to the child, from the continued compression made on it and its appendages.

During this process of distension and elongation of the vagina, the direction of its orifice is completely altered: instead of being nearly parallel to the rami of the pubes, the lower portion is projected downward and forward; so that now the whole orifice becomes very oblique to the inferior strait, its plane, when the woman is lying upon her back, presenting upward, and approximating, therefore, a horizontal position. The orifice of the rectum becomes much enlarged, and assumes an elliptical shape, with its long diameter from the anterior to the posterior part; the anterior surface of the rectum presenting a smooth, dark-colored surface at the anus. The *frænum perinei*, or *fourchette*, rendered extremely thin by the great distension, is felt subtending the top of the head across the region of the posterior fontanel; as the head advances it will be found gradually receding, sometimes very slowly,

over the sagittal suture and the parietal protuberances, at which moment there is the greatest distension of the orifice of the vagina. (Plate VI., Fig. 45.) As soon as the parietal protuberances are passed, the natural elasticity of the perineum, and especially the contraction of its muscular fibres, will cause the margin of the perineum to recede rapidly over the anterior inclined surfaces of the child's head—passing successively over the parietal and frontal bones, the forehead, face, and, finally, over the chin of the child, and thus affording immediate and most positive relief to the mother's agonies, the head being now born. (Plate VI., Fig. 46, Plate VII., Fig. 47, and Plate XVII., Fig. 97.)

It is interesting and important to study how this process is effected.

The first fact to be noticed is the arrest of the progress of the base of the cranium at the top of the arch of the pubis; the neck or spine of the child being in close contact with the inner portion of the bodies of the pubes, prevents any further advance at this point. The base of the cranium, or the sub-occipital region—the nape of the neck—is directly under the sub-pubic ligament, to which it is closely applied.

The second observation is that the child is still forced down by the contractions of the uterus, acting through the medium of the spine, in the direction of the axis of the superior strait, as they did at the commencement of labor. The tendency, therefore, of this force is to drive the head more and more against the os coccygis and the posterior perineum: but these tissues affording a firm resistance, the head is compressed between antagonizing forces—the action of the uterus above and the resistance of the perineum below; and hence, it is forced off in a diagonal direction between these two forces toward the orifice of the vagina.

As the sub-occipital region is arrested by the neck of the child at the arch of the pubis, the whole head, as it advances, has to revolve upon the sub-pubic ligament as a centre, the top of the head describing, from the coccyx to the *fourchette*, a segment of a circle, the radius of which is the cervico-bregmatic diameter. During this revolution, which is evidently a process of constant extension, the top of the head passes over the posterior surface of the vagina; the occipital protuberance ascends more and more until it is in front of the symphysis pubis, while the *fourchette* gradually recedes, until it reaches the parietal protuberances, where there is usually considerable delay, but as soon as these are passed, it recedes rapidly to the neck of the child.

This process of extension over the distended and

elongated perineum is facilitated by the direction in which the bearing-down efforts are impressed upon different portions of the head. Thus, it has been remarked, that at the commencement of labor, when the head is in a state of flexion, the direction of this force is toward the vertex; when the head has reached the inferior strait of the pelvis in a state of partial extension the direction of the force is to the top of the head, corresponding to its perpendicular diameter. If the head advances, the direction is still more forward, and will soon strike the apex of the os frontis, and eventually the face and chin, when the extension will be complete; the base of the occiput approximating the anterior surface of the pubis, while the back of the neck is at its posterior surface, the pubis, therefore, intervening between the head and spine of the child. It is evident, therefore, that owing to the resistance of the curved line of the sacrum and perineum, the process of extension is facilitated more and more by this direction of the power of the uterus, first toward the middle, and then toward the anterior parts of the head, causing the rapid descent of the forehead and face of the child, until extension be perfected.

It is evident, also, that the head may be considered as describing the segment of a circle, the radius of which is at least three and a half inches, extending from the sub-occipital region to the top of the head of the child. Hence, the child, after descending through the cavity of the pelvis and the inferior strait, in the direction of the axis of the pelvis, continues its curvilinear course corresponding to the line, formerly described, as representing the axis of the distended vagina. In other words, the occipito-mental diameter of the child's head, which, at the superior strait, was parallel to the axis of this opening, and then to the axes of the several planes of the pelvis, including that of the inferior strait, will now be found successively coincident with the axes of the different planes of the vagina, including that of its external orifice. (Plate V., Fig. 39.)

The truth of this observation will be confirmed by accurately observing that, at the time of transit of the occipital extremity of the head through the distended orifice of the vagina, the nape of the neck will be found at the top of the arch of the pubis, the parietal protuberances on each side of the vulva, and the apex of the head, or posterior margin of the anterior fontanel, at the fourchette, while the posterior fontanel will be toward the centre of the opening. In other words, the cervico-bregmatic diameter is coincident with the antero-posterior diameter of the orifice of the vagina, the bi-parietal corresponds to its transverse diameter, and the occipito-mental to the axis of its plane. The

child's head, therefore, passes perpendicularly to the orifice of the vagina, in the same manner in which it passed perpendicularly to the superior strait, os uteri, and inferior strait.

The child's head, thus passing through the curved canal of the pelvis and vagina measuring some ten or twelve inches from the promontory of the sacrum to the frænum perinei, presents, with almost mathematical precision, the short diameters of the head parallel to the diameters of the various circles of the pelvis. The occipito-mental diameter, always corresponding to the ever varying direction of the axis of the different planes of the parturient canal, changes, during this process, its oblique position to a direct one by a semi-spiral rotation. This is caused by the influence of the bearing-down efforts from above, and is opposed by the resistance of the sacrum, coccyx, and perineum below. It is, indeed, a wonderful movement under the conjoint influence of vital and mechanical forces and resistances. The accoucheur, who is best acquainted with this mechanism, will prove the safest, as well as the most efficient practitioner.

As soon as the head passes out of the vagina, the base of the occiput will be found directly in front of the pubis, and the chin in front of the perineum; the posterior commissure of the vulva being closely applied to the front of the neck. Very generally, at this moment, the head turns spontaneously into an oblique direction, so that the occipital protuberance will point toward the left groin, and the chin toward the right tuber ischii. The head thus resumes its original oblique position from left to right, and hence this movement of the head has been very correctly termed "*restitution*," or "*restoration*." (Plate VII., Fig. 48.)

The cause of this change is very evident, for it has been already mentioned that, during the process of rotation, the shoulders of the child generally remain oblique, necessitating, therefore, a torsion or twist in the neck, which continues until the complete delivery of the head at the vulva. At this moment, all resistance being removed from the head, this forced or constrained condition of the neck vanishes; it is untwisted, and the head again becomes oblique to the pelvis, but direct, as respects the body of the child.

We have too often witnessed the instantaneous occurrence of this restitution, sometimes to a very great degree, to subscribe to the theory of M. Gerdy, who contends that there is strictly no restitution after delivery, but that the head remains quiescent with the occiput to the pubis, until the shoulders rotate in the cavity of the pelvis. He declares that during the process of rotation of the head on the left inclined plane of the pelvis, no twist in the neck occurs, but that the shoul-

Fig 47



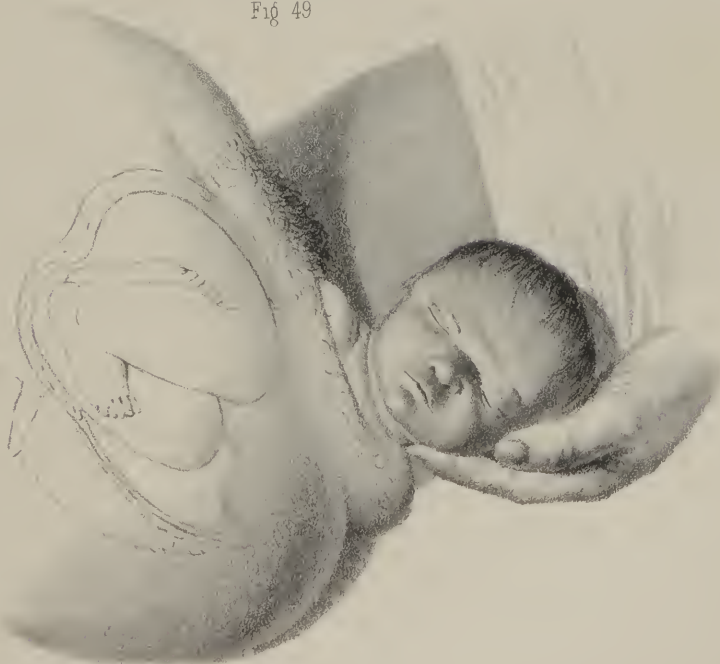
1st position of Vertex
Perineum retracted.

Fig 48



Resitution

Fig 49



External rotation

ders, originally oblique at the superior strait, become transverse in the pelvis when the occiput reaches the arch of the pubis. Hence, as there is no twist in the neck, there can be, strictly speaking, no rotation. We believe, however, that M. Gerdy has made a rule out of an exception; for, although there can be no doubt that occasionally the shoulders are transverse when the head is delivered, yet we insist that this is rarely the case, and that very generally the shoulders remain oblique when the head rotates: the neck, therefore, is twisted, and, of course, in a constrained condition. This constraint disappearing after delivery, necessitates the return of the head to its former obliquity.

This fourth period is now finished, to the great relief of the suffering parent.

Fifth Period of the Second Stage.—If the practitioner now makes a careful examination, he will find that the uterine tumor is exceedingly diminished; that the right shoulder of the child presses on the right anterior inclined plane of the pelvis, and the left shoulder on the left posterior inclined plane, while the back of the child is toward the left foramen thyroideum, and its breast toward the right sacro-sciatic foramen. The return of the bearing-down efforts forces the body of the child directly downward toward the perineum; but, as the right shoulder presses upon the inclined plane anteriorly it is directed toward the arch of the pubis from the right toward the left; the shoulder thus rotating in a direction opposite to that executed previously by the occiput, which was from left to right to the arch of the pubis. Of course the left shoulder rotates posteriorly from left to right, and may be detected opposite the os coccygis. The right shoulder will now be perceived at and under the sub-pubic ligament; of course the spine of the child will be to the left, and the sternum to the right of the pelvis. It will be found that simultaneous with this rotation of the shoulders, the head, free externally, again changes its position, the occipital protuberance, instead of pointing to the groin, will be directed to the left thigh of the mother, and the face, instead of being directed to the tuber ischii, presents toward the right thigh; in other words, the head is transverse, because the sides of the child are to the anterior and posterior portions of the mother. This motion of the child's head, resulting from the rotation of the shoulders, is entirely distinct from and subsequent to the process of restitution. It is now known by the expression of "*External Rotation.*" (Plate VII., Fig. 49.) This is almost universally observed in cases of cephalic deliveries, inasmuch as it is very rare for the shoulders to pass out, unless one be directed anteriorly and the other posteriorly. Restitution may often be absent,

because the shoulders may be transverse in the pelvis, and therefore there is no twist in the neck of the child; but external rotation generally ensues to a greater or less extent, as the shoulders very rarely are delivered transversely.

At or before the completion of this rotatory movement, the shoulders enter the inferior strait of the pelvis, the right shoulder being to the pubis, and the left to the os coccygis. Hence, the bi-acromial or long diameter of the chest is coincident with the coccy-pubal or long diameter of the inferior strait. The body of the child now occupies the cavity of the pelvis, the hips being at the superior strait. Hence, as the pelvis is curved, there must, of necessity, be a corresponding curve of the body of the child in a lateral direction; the right side being slightly concave toward the pubis, and the left convex toward the sacrum. (Plate VII., Fig. 49.) This is the commencement, therefore, of the "lateral flexure" of the child's body.

Thus arranged, the shoulders pass the inferior strait, under the renewed efforts of the mother. It will now be found, however, that they do not advance *pari passu*; on the contrary, the right shoulder is retained at the symphysis pubis, owing partly to the firm pressure applied against it, and partly to the flexed character of the body. The arm of the child, or occasionally the apex of the shoulder, impinges behind the body of the pubis, while the posterior or left shoulder very rapidly revolves over the whole posterior portion of the vagina from the coccyx to the posterior commissure of the vulva—thus describing a segment of a circle, the radius of which is the bi-acromial diameter of the chest, and the centre the sub-pubic ligament, precisely analogous to that previously described by the top of the head. During this transit, the lateral flexure of the body of the child is continually augmented in proportion to the degree of rigidity of the perineum; the greater the resistance, the more projecting will be the distended perineum, and the greater will be the lateral flexure of the child's body.

The shoulders are now brought to the orifice of the vagina, the posterior margin of which occasionally causes some delay, as it covers the apex of the left shoulder. This, however, soon yields, and both shoulders pass out simultaneously, one directly at the symphysis pubis, and the other toward the middle line of the perineum. No further delay usually ensues; the vagina is retracted rapidly, by its elastic and contractile powers, over the whole of the left side of the child, while the right side as rapidly passes out in contact with the symphysis pubis, thus terminating the fifth and final period of expulsion.

Occasionally it will be found that the pelvis of the child is unusually large, and may therefore be delayed at the inferior strait and at the orifice of the vagina. This is rarely of any importance, as the long diameter of the hips corresponds to the long diameter of the inferior strait, and a little additional effort on the part of the mother is very generally sufficient to effect delivery.

Accoucheurs have disputed which shoulder is delivered first. It is represented by most observers, that the perineal shoulder, although it has a longer course, is delivered sooner than the pubic. We apprehend, however, that the delivery of each is usually simultaneous. There can be no doubt that the pubic shoulder is perceived first under the pubis, even as soon as the sacral shoulder reaches the os coccygis; but here it remains stationary, until the sacral shoulder has reached the fourchette. Moreover, there is no advance of the pubic shoulder until the margin of the perineum glides over the apex of the left shoulder, at which instant both shoulders advance simultaneously—the bis-acromial diameter of the chest being coincident with the antero-posterior diameter of the orifice of the vagina. In some cases, however, the pubic shoulder gets behind the symphysis pubis: in such cases, it does not descend under the arch until after the delivery of the posterior shoulder.

M. Nægèlè and others have contended that the rotation of the shoulders is not always complete, but that they usually pass obliquely through the inferior strait, and even the orifice of the vagina; the right shoulder being toward the ramus of the pubis on the right side, and the left toward the left sacro-sciatic ligament. Doubtless this is true in many cases where the child is small, or the perineum much relaxed; but when the child is of the natural size, and the perineum has the usual rigidity belonging to the primiparous woman, rotation will be complete; the greater the resistance the more perfect the rotation. Hence, we may fairly infer that the more complete the rotation, the easier the delivery, and this fact should be the guide for the conduct of the accoucheur in all cases of artificial delivery.

RIGHT OCCIPITO-ANTERIOR POSITION.—In this (second of Baudelocque) position also, the anterior part of the vertex is felt toward the centre of the pelvis; the occiput will be opposed to the right pectineal eminence, and the top of the os frontis, as represented by the bi-frontal suture, will be opposed to the left sacro-iliac symphysis.

For reasons already given, in regard to the first position, this also may be described as having the occiput to-

ward the right anterior inclined plane, and the os frontis toward the left posterior inclined plane of the pelvis. Hence, the back of the child will be upon the right and anterior portion of the uterus, while the limbs will be posterior and to the left; the right side of the child will be posterior and to the right, and the left side of the child will be anterior and to the left. Hence, the left parietal protuberance, and eventually the left acromion process and the left hip will be pubic instead of sacral as in the first position.

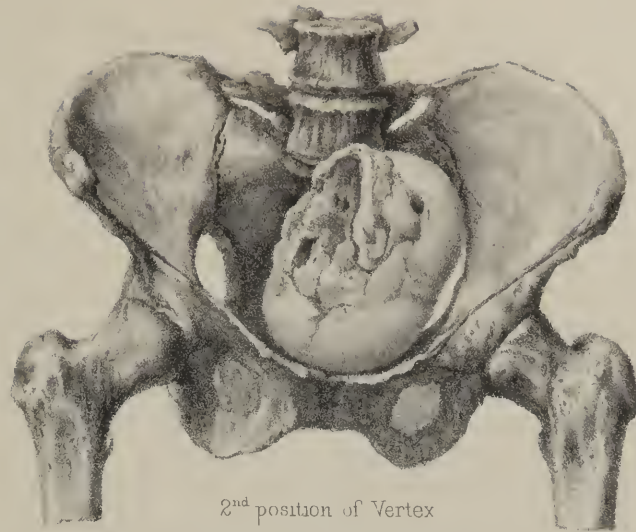
The relative frequency of the second position has become a subject of much discussion. It is universally admitted that the first position is most generally observed of all the positions of the vertex. We have already quoted Madame Boivin as stating this to be seventy-six per cent.; the same distinguished practitioner declares that the frequency of the second position is very nearly eighteen per cent., and she may be considered as representing the opinions of all obstetric writers until the period of M. Nægèlè's publication. This gentleman questions the accuracy of these observations, asserting that if a vaginal examination be carefully made at the commencement of labor in all the right occipital positions, it will be found very universally that the occiput will be posterior, not anterior. He affirms that in twelve hundred cases of right occipito-iliac positions, he did not meet with a single case of a second position; that they were all occipito-posterior positions, (third of Nægèlè, fourth of Baudelocque.) This statement of the German Professor is sanctioned by MM. Dubois, Cazeaux, and Stoltz; although perhaps not to the same extent, as Dubois says that out of five hundred and forty-six right occipito-iliac positions, four hundred and ninety-one were at the right sacro-iliac symphysis, and fifty-five were at the right acetabulum.

There is, no doubt, much truth in the statements of the German Professor; but we are not disposed, from our own observation, to sanction his extreme views, believing that the second position, although not so common as formerly supposed, yet is by no means very rare.

We should explain its infrequency by the fact that the sigmoid flexure of the colon occupies so much of the left iliac fossa as to determine the face and limbs of the child most frequently posterior and to the right, as in first positions, and occasionally anterior and to the left, as in fourth positions.

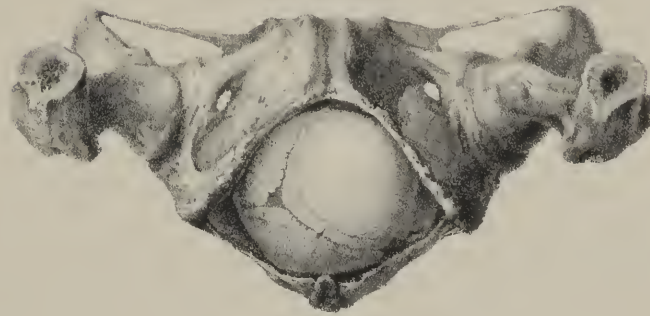
The mechanism of labor in such cases is precisely similar to that involved in the first position: in both the vertex presents, and in both, after flexion, the short diameters of the head correspond to the oblique diameters of the os uteri and superior strait of the pelvis;

Fig 50



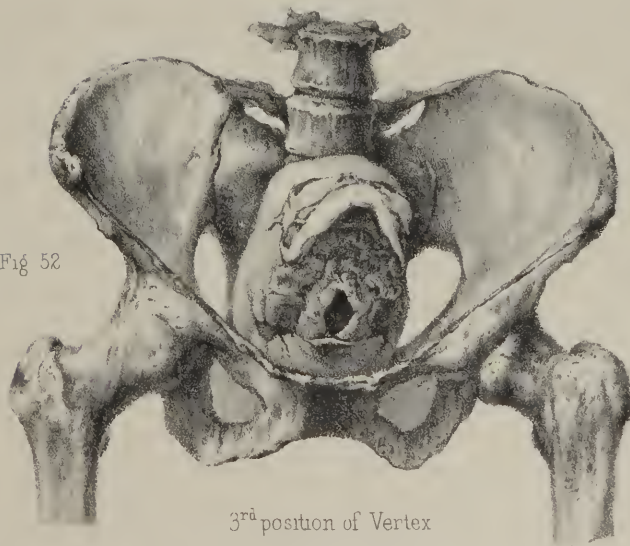
2nd position of Vertex
at Superior Strait

Fig 51



in Cavity of Pelvis

Fig 52



3rd position of Vertex
at Superior Strait.

while, of course, the occipito-mental diameter is coincident with the axis of the uterus and with that of the superior strait of the pelvis. It varies simply in the fact that in the second position the cervico-bregmatic diameter corresponds to the right oblique, and the biparietal to the left oblique—the reverse of what occurs in the first position. (Plate VIII., Fig. 50, and Plate XVIII., Fig. 101.)

During the first period, therefore, of the second stage of labor, the child's head descends through the superior strait and the os uteri, flexion continually increasing, until the parietal protuberances have passed the edges of the os uteri.

Then during the second period, or that of descent, the head rapidly approaches the floor of the pelvis, (Plate VIII., Fig. 51,) and, finally, the inferior strait. Rotation takes place, in this instance, in the opposite direction to that in the first position; for now the occiput strikes upon the anterior inclined plane upon the *right* side, and, of course, rotation occurs not from left to right, as in the former case, but from right to left anteriorly. Thus, the occiput is brought from the right side of the pelvis forward under the arch of the pubis; while the os frontis rotates posteriorly from the left sacro-iliac symphysis so as to bring the face toward the sacrum. This process of rotation in the second position is accomplished, it is said, with a little difficulty, owing to the rectum being located to the left of the median line of the sacrum: of this there can be little doubt, when this intestine is distended with feculent matter; but when empty it occupies so little space that no appreciable resistance is afforded to the rotation of the face toward the sacrum. During this process of descent, the slight obliquity of the head as it approximates the inferior strait, giving rise to a lateral flexure of the neck, is here on the left side, which will be, therefore, concave toward the pubis, while the right side of the neck will be convex toward the sacrum.

Here, also, if there be delay in the process of rotation toward the end of this period, the caput succedaneum will be found opposite to the orifice of the vagina, and on the superior posterior angle of the left parietal bone, instead of the right, as in the first position.

The process of delivery, during the third and fourth periods of this stage, are precisely similar to that in the first position. The occiput, on delivery of the head, rises up in front of the pubis, and the perineum glides under the lower jaw to the neck of the child; but restitution occurs in an opposite direction—the head is restored to its original oblique position, and, of course, the occiput will now point to the right groin, and the chin to the left tuber ischii; the occipito-mental diameter of the head crossing the vulva obliquely, but in an op-

posite direction, over the right labium, while in the first position it crossed the left labium.

During the fifth period, the shoulders descend and are delivered precisely in the same manner as detailed in the first position, excepting that the rotation occurs in a different direction and upon different inclined planes. In this case the left shoulder plays upon the left anterior inclined plane, and the right shoulder upon the right posterior inclined plane; the necessary consequence of this is, that the apex of the left shoulder rotates from the left to the right anteriorly under the arch of the pubis, while the right shoulder rotates from the right to the left, posteriorly, toward the sacrum. Thus, the left shoulder, under the sub-pubic ligament, becomes the centre upon which the right shoulder and the body revolve during this fifth period, and the consequent lateral flexure of the body of the child toward the pubis is upon the left side, and not upon the right, as in the former position. Hence, also, as this rotation of the shoulders occurs, the head externally rotates with them, so that the occiput turns directly to the right and the face to the left thigh of the mother, constituting "external rotation."

There is virtually, therefore, no difference in the mechanism of labor in these two positions, due allowance being made for the opposite direction, which the rotation of the head and the shoulders must necessarily pursue in consequence of the difference of the original position of the occiput—in one case it is toward the right, and in the other toward the left acetabulum.

OCCIPITO-PUBIC POSITION.—In this position (the third of Baudelocque) the occiput is toward the pubis and the superior part of the os frontis toward the lumbar vertebræ; of course, the spine and back of the child are directly anterior, and the limbs and abdomen posterior, opposite the spine—the right side of the child being to the right of the mother, and the left side to her left.

This position is so exceedingly rare, that many teachers ignore it completely. This has been done by M. Nægelè, and most of the German accoucheurs, and by many also in France and England; still, however, it does occur. Baudelocque and Velpeau both treat of this position of the vertex. Madame Boivin has met with it six times in twenty thousand five hundred and seventeen cases. Radford speaks of its existence, and Dr. Dewees reports three cases in his own practice. The author also has recognized this position of the vertex in several instances at the commencement of labor.

Although it usually spontaneously disappears, yet, in some instances, it remains persistent, giving rise to de-

lays, which may prove to be serious. The unfrequency of this position, and its tendency to spontaneous disappearance even when it does occur, are readily explained by the projection of the lumbar vertebræ into the superior pelvis, so that the space between the linea alba and the spine is far less than in the oblique direction. It results, also, that as soon as any pressure, from the contractions of the uterus, is made upon the head, the convex surface of the os frontis will be readily turned off to the right or left of the spine, thus converting it from the third to the first or second position. In a few cases, the continuance of the third position may be maintained by some peculiar elongated form of the superior strait, so that the antero-posterior diameter may be comparatively long; in other instances, owing to some imperfect application of the bones of the os frontis, the anterior fontanel and bi-frontal commissure may be so large as to yield to the pressure of the promontory of the sacrum and lumbar vertebræ, so as to fix the head in this direction.

M. Velpeau also suggests that the large size of the psoæ muscles and the blood-vessels, etc., may, in some instances, so diminish the bi-lateral diameter that the head will be best accommodated directly between the pubis and sacrum, especially when the promontory of the sacrum is not so great as usual. In either case it becomes the practitioner to understand the mechanism concerned in this third position of the vertex.

After flexion is completed by the bearing-down efforts of the uterus, the base of the occiput will be found against the bodies of the pubes, and the anterior fontanel opposed to the promontory of the sacrum, while the parietal protuberances will point to the sides of the pelvis. (Plate VIII., Fig. 52, and Plate XIX., Fig. 102.) Hence, it results that the cervico-bregmatic diameter coincides with the sacro-pubic diameter of the superior strait, and the bi-parietal with the bis-iliac diameter. Hence, also, the occipito-mental diameter, as usual, coincides with the axis of the superior strait. In such cases, therefore, there can be no difficulty as regards the transverse diameter of the head, as it is parallel to that of the pelvis, which here measures five and a quarter inches. There may, however, be delay as regards the cervico-bregmatic diameter, coinciding with the short diameter of the superior strait and measuring only four inches; the difference between the two diameters is only six lines, or even less, owing to the thickness of the bladder, uterus, etc., which are more or less involved. Hence, delay almost universally occurs at the beginning of the second stage of labor; indeed, it must exist until the bearing-down efforts have perfected the flexion of the child's head, for so long as this is imperfect, the head cannot enter

in this direction: nevertheless, if there be no deformity of the head or pelvis, the woman can readily deliver herself. A few strong contractions will complete the flexion, and force the child perpendicularly through this strait into the pelvis. It is a case, therefore, of simple or unassisted labor.

It should be remarked, that, owing to this resistance at the superior strait, the occiput generally passes about the same time through this superior opening of the pelvis and the orifice of the uterus, while, in ordinary occasions, the head passes first through the superior strait, and then through the os uteri. The fact, therefore, that the short or conjugate diameter of the superior strait is involved in these third positions, constitutes their chief peculiarity.

This first period of the second stage of labor being completed, the second is rapid and comparatively easy, inasmuch as the occiput is at the pubis, *no rotation* is requisite, and there is no resistance from the sides of the pelvis. Hence, also, there is no lateral flexure of the neck of the child; and, if any tumor of the scalp is found, it will be observed, not on the right or left of the vertex, as in first and second positions, but over the upper part of the occiput.

The occiput descends till it gets under the arch of the pubis; but, as soon as the occipital protuberance passes under the sub-pubic ligament, the forehead passes the promontory of the sacrum, and the face readily falls into its cavity; so that extension immediately commences, and the head is brought to the inferior strait of the pelvis, through which it passes precisely in the same manner as in the first and second positions of the vertex. No peculiarity exists during the fourth period; at the termination of which the occiput is found in front of the pubis, and the perineum to the neck of the child. In this position, however, it remains stationary, for as there was no rotation, so there is no twist in the neck, and hence, also, no *restitution*; the child's head being in the same direction when delivered externally, as at the commencement of labor.

In the fifth period, there may, however, be some slight delay, inasmuch as the shoulders will usually be found in a transverse position in the cavity of the pelvis; the long diameter of the chest, therefore, being opposed to the short diameters of the outlet. As the bearing-down efforts, however, continue, the shoulders will be found to rotate, sometimes so as to bring the right shoulder to the pubis, as occurs in first positions, and sometimes the left shoulder, as occurs in second positions. Why one shoulder should rotate forward in preference to the other must depend upon some accidental causes; if one shoulder, for ex-

ample, should be a little more in advance than the other, it, of course, would glide more readily forward; or, if the rectum should be distended with gas or fæces, this also might have its influence in retarding or facilitating the rotation of one or the other shoulder, anteriorly or posteriorly. In either event the delay is short, and of no serious importance; and the body is delivered as on former occasions, the child's face presenting to the right thigh of the mother, when the right shoulder appears at the pubis, but to the left thigh when the left shoulder is pubic.

RIGHT OCCIPITO-POSTERIOR POSITION.—The occipito-posterior positions of the vertex are also subdivided into three—the reverse of the three occipito-anterior positions.

The fourth position, (of Baudelocque,) therefore, is directly the reverse of the first; the occiput will be found toward the right sacro-iliac symphysis, while the top of the os frontis will be toward the left acetabulum. Hence, the back of the child will be posterior and to the right, and the limbs of the child anterior and to the left. Of course, therefore, the left parietal protuberance, the left shoulder and the left hip, will be anterior and to the right, or, as it is usually termed, pubic; and the right parietal protuberance, right shoulder and right hip will be posterior and to the left, or, as it is termed, sacral.

Nægelè has rendered it probable that this position is next in frequency to the first position; the explanation of this has already been given. He states that it occurs at the rate of thirty per cent. Madame Boivin gives, on the contrary, eighteen per cent. to the right occipito-anterior position, while to this right occipito-posterior she allows 0.92 per cent.

M. Nægelè has also established the fact that in a large majority of these fourth positions, the occiput will rotate forward under the arch of the pubis, and, therefore, that the mechanism of labor does not essentially differ from that of the occipito-anterior position. Dr. Dewees also has observed that "when the posterior fontanel is at all in advance of the sacro-iliac junction, it will almost always, eventually, place itself under the arch of the pubis." But there can be no doubt that, in some instances, the occiput rotates posteriorly toward the middle line of the sacrum, causing delays and difficulties from various causes, which may demand artificial assistance for the safety of the child or even of the mother. M. Nægelè himself declares that in ninety-six cases of right occipito-posterior positions the occiput rotated posteriorly three times, or one in thirty-two cases. Hence, it becomes necessary to study the mechanism of labor in the fourth position, in order

to understand what nature attempts to do in these cases, and, of course, when and how to render timely and suitable assistance.

Although in any of these posterior oblique positions of the head, the occiput may rotate forward, yet no satisfactory explanation has been given of this important phenomenon, nor why, in other cases, rotation will occur toward the sacrum. As already intimated, the explanation depends upon the comparative length of the anterior and posterior inclined planes of the pelvis. (Plate III., Fig. 21.) Hence, when the head descends in the fourth position, if the point of the occiput should strike upon the spinous process of the ischium, or extreme boundary of the anterior inclined plane, it will be reflected anteriorly toward the arch of the pubis, and delivery be effected as in an original second position. If, however, the point of the occiput should strike posteriorly to the spine of the ischium, it will be reflected backward to the hollow of the sacrum. If the reader will refer to what has been already said of the lateral inclined planes of the pelvis, and to the continuation of these planes, by means of the levatores ani muscles and other tissues forming the floor of the pelvis, and will bear in mind the projection of the spines of the ischia not only backward but inward, so as suddenly to diminish the transverse diameter of the pelvis at this point, he may perceive the mechanical necessity why the occiput should be determined anteriorly rather than posteriorly, if it strike upon the spine of the ischium. The inward projection of this process resists the backward tendency of the occipital protuberance, and determines it along the anterior inclined plane on the right side of the pelvis, as it is there formed by the lower portion of the ischium and the levator ani muscle. On the contrary, the point of the occiput, striking posteriorly to this process, is determined backward on the posterior inclined plane toward the sacrum. We have, therefore, an explanation of the greater frequency of the anterior rotation of the head in these oblique occipito-posterior positions, inasmuch as the anterior plane is the longer. There is also another reason why the forward rotation should be more frequent, arising from the great projection of the promontory of the sacrum, in consequence of which the whole head is determined toward the anterior part of the pelvis; and hence, unless the position be originally very oblique, the point of the occiput, during its descent, will be inclined somewhat forward, from the posterior to the anterior inclined plane. In all cases, therefore, of the so-called fourth position of the vertex, where the occiput plays upon the anterior inclined plane, it should be practically regarded as a second position; the mechanism of labor being virtually the same

in both cases. Of course, however, the rotation of the head will, *ceteris paribus*, be found more difficult, painful, and tedious, in proportion to the distance of the occiput from the anterior crus of the ischium.

The strictly fourth positions, therefore, are those where the occiput strikes the posterior inclined plane of the pelvis. Of the existence of such cases there can be no doubt, as almost every accoucheur can testify.

During the first period, there is no special trouble in the transit of the head through the superior strait and os uteri. The head being well flexed, (Plate IX., Fig. 53,) the short diameters correspond to the oblique diameters of the superior strait, precisely as in the first position of the vertex, with the single exception, that the bregmatic extremity of the cervico-bregmatic diameter now points to the left acetabulum instead of to the right sacro-iliac symphysis, as it did in the first position, and the right extremity of the bi-parietal diameter now points toward the left sacro-iliac symphysis instead of the right acetabulum. This, however, can make no difference in the mechanism. The head, therefore, descends perpendicularly to the plane of the superior strait or os uteri, with the same facility as in the first position of the vertex.

During the second period, or that of descent, difficulties begin to accumulate, and gradually augment until the head be delivered. The character of these difficulties will be apparent after describing the natural process of delivery as determined by careful observation.

The first point to be remembered is, that as the occiput is posterior, the expulsive powers of the mother, acting upon the head through the medium of the spine, are directed more toward the posterior part of the pelvis than in the anterior positions. Hence, after the os uteri is dilated, the occiput descends rather rapidly on the posterior inclined plane of the pelvis, (Plate LX., Fig. 54,) acting chiefly on the superior or short sacro-sciatic ligament, and is determined backward toward the hollow of the sacrum. This disposition of the occiput to rotate posteriorly is somewhat facilitated by the top of the os frontis pressing against the left anterior inclined plane, by which it is determined in an opposite direction, from left to right, toward the pubis; the occiput, on the contrary, rotating from right to left toward the sacrum. This rotation is accomplished with difficulty, and sometimes is not perfected until the occipital protuberance passes the extremity of the coccyx; while, in other instances, it may be complete while the point of the occiput still presses upon the sacrum and coccyx.

The head of the child, as it passes the os uteri, is in a state of great flexion, but as soon as it is liberated from this orifice, it is somewhat relieved from pressure,

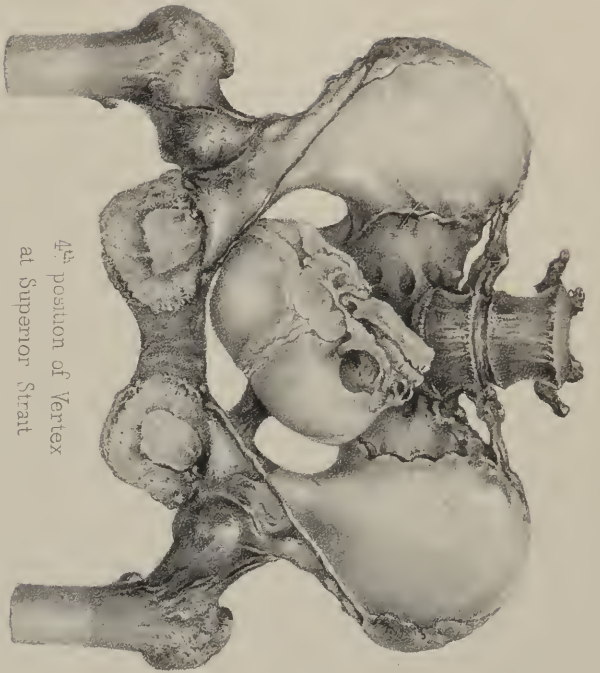
and returns, therefore, as in the first position, to a state of demi-flexion, as it has more room in the cavity of the pelvis than when embraced simply by the neck of the uterus. This state of demi-flexion is, however, very transitory. In a few moments the bearing-down efforts are directed against the occipital bone, impinging it against the sacro-sciatic ligaments and os coccygis, which latter is soon brought to a state of forcible extension; while the os frontis is arrested behind the body and ramus of the pubis. Hence, flexion rapidly augments. The chin of the child is pressed firmly against its sternum, while the occiput impinges against the os coccygis. At this moment, owing to the shortness of the neck of the child, which now subtends the whole depth of the pelvis posteriorly, the chest descends through the superior strait, so that the thorax of the child and the facial portion of the head become compressed between the pubis and the sacrum. The fronto-mental diameter of the face and the dorso-sternal diameter of the thorax are nearly coincident or continuous between the pubis and the sacrum. By the powerful contractions of the uterus, the occiput is gradually forced downward and forward, until it passes the point of the extended coccyx; then it impinges firmly against the posterior perineum, pressing it backward as much as possible. Generally the pressure is more on the right than on the left of the median line.

During this process of descent, that of rotation is also gradually progressing: the occiput pressing upon the posterior inclined plane of the pelvis, gradually turns toward the middle line of the sacrum and coccyx; while the top of the os frontis, directed against the left anterior inclined plane, looks more and more toward the symphysis pubis. This process of rotation continues during the whole of the second period, and often is not entirely completed until the third period, when the head is fairly engaged in the inferior strait.

This rotatory movement of the head, implying very generally a twist in the neck of the child, is sometimes very tedious, requiring great bearing-down efforts to effect sufficient flexion and rotation. It is in such cases that a caput succedaneum or tumor of the scalp is often formed, as in the anterior position of the vertex, opposite to the orifice of the vagina; in this case, however, it will be detected upon the left anterior superior angle of the parietal bone,—this being the region of the head which is not supported by the walls of the pelvis and vagina. It does not, however, constitute the presenting part, as many would have us suppose, as it is not toward the *centre* of the pelvis, but toward its anterior portion.

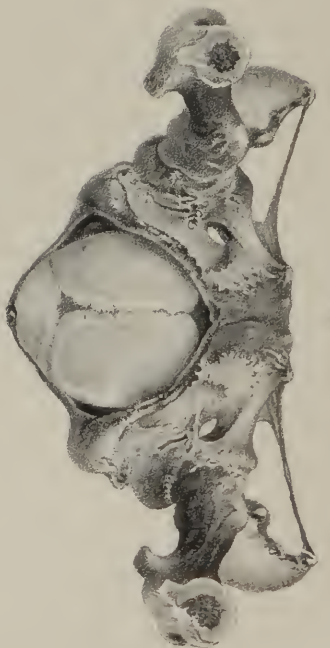
The occipital protuberance having passed the sacro-

Fig. 53



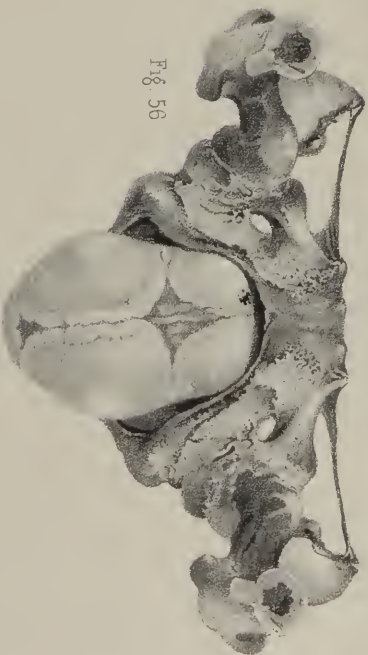
4th position of Vertex
at Superior Strait

Fig. 55



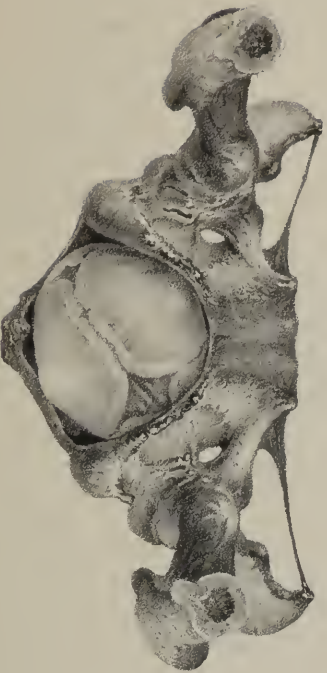
at Inferior Strait.

Fig. 56



partial Extension

Fig. 54.



in Cavity of Pelvis.

Fig. 57



Head delivered.

siatic ligament and os coccygis, the second period of labor terminates.

The returning pains continue to impel the occiput against the posterior perineum, which gradually yields, so as to allow the nape of the neck to be opposed to the os coccygis; while the flexion of the head still augments, so that the chin of the child is forcibly impelled against the sternum, and afterward against the lower part of the neck—the neck, in these cases, being gradually elongated, so as to allow a still greater degree of flexion. The head is now in the inferior strait, when it will be found that rotation is nearly or quite perfect. (Plate IX., Fig. 55.) Careful examination will show that the nape of the neck or sub-occipital region of the head is opposed to the os coccygis, while the anterior fontanel is at the sub-pubic ligament; the left parietal protuberance is at the tuber of the right ischium, the right at the left tuber; the posterior fontanel covered by the distended perineum will be found near the centre of the inferior strait; and the chin of the child will be directed upward toward the promontory of the sacrum. (Plate XIX., Fig. 104.) Hence, the cervico-bregmatic diameter corresponds to the coccy-pubal, the bi-parietal to the bis-ischiatic, and the occipito-mental diameter of the head is nearly coincident with the axis of the inferior strait; in other words, the occipital extremity of the head passes the inferior strait of the pelvis, presenting its cervico-bregmatic circumference parallel with that of the outlet of the pelvis.

We say the occipito-mental diameter is “nearly coincident” with the axis of the inferior strait; it is seldom, perhaps, completely so, because the thorax of the child being now compressed in the pelvis, resists the tendency of the chin to descend posteriorly. The third period is now completed.

As the labor advances, it will be found that the top of the os frontis is fixed; or, as M. Baudelocque would observe, “even remounts” behind the symphysis pubis, while the anterior fontanel under the sub-pubic ligament will remain nearly stationary. The occipital protuberance, under the bearing-down efforts of the mother, is forced to revolve along the posterior wall of the distended and elongated vagina toward the fourchette, thus describing a segment of a circle, the radius of which is the cervico-bregmatic diameter, and the centre is at the symphysis pubis. This revolution of the head upon the pubis is precisely analogous to what occurs in the anterior positions; the only difference being that the bregmatic extremity of the cervico-bregmatic diameter is at the sub-pubic ligament, instead of the cervical extremity, as in the occipito-anterior positions. During this process the whole power of the uterine con-

tractions, operating upon the occiput, has a tendency to force it directly downward; which tendency, being resisted by the curved line of the perineum, causes the occiput to diverge forward and to ascend on the perineum more and more toward the orifice of the vagina: the flexion of the neck, if possible, being still augmented.

In this manner the vertex is brought to the orifice of the vagina; the fourchette, enormously distended, gradually recedes over the parietal bones, the posterior fontanel, and the superior part of the occiput to the nape of the neck. The greatest possible flexion of the head, and distension of the perineum and orifice of the vagina now exist. At this time it will be found that the anterior fontanel is still at the pubis, the base of the occiput at the frænum perinei, and the parietal protuberances on either side. Of course, the cervico-bregmatic circumference is parallel with the orifice of the vagina, and the occipito-mental diameter corresponds to the axis of this orifice.

In a few moments the head is protruded, the perineum recedes to the base of the occiput, where for a short time it is arrested; the sides of the os vaginae recede over the parietal protuberances, while the occiput now revolves backward over the posterior margin of the vagina, and at the same moment the anterior fontanel passes from under the pubic ligament, (Plate IX., Fig. 56,) followed by the os frontis, forehead, and face of the infant, in rapid succession. After the chin passes under the arch, it immediately ascends up in front of the pubis, owing to the retraction and contraction of the perineum against the neck of the child, pressing the whole head forward. (Plate IX., Fig. 57, and Plate XX., Fig. 105.)

The head is thus delivered at the external orifice by the process of *extension*, which, however, does not commence until the occipital protuberance has passed the orifice of the vagina. Hence, *flexion* continues to be augmented during the whole of the second, third, and fourth periods of delivery; and after the completion of the last, extension suddenly begins exteriorly to the vagina, and is rapidly completed.

As soon as the head is liberated, restitution ensues, owing to the neck, which had been twisted during rotation, returning to its original condition. Hence, the chin of the child will now point toward the left groin, and the occiput toward the tuber of the right ischium; the occipito-mental diameter crossing the labia from right to left, and from below upward.

This, we believe, is the natural mode of delivery, as we have observed it in primiparous patients, and as recorded by such accurate and excellent obstetricians as Baudelocque, Velpeau, etc. Here, as in anterior posi-

tions of the vertex, the greater the resistance the more accurately do the diameters of the great occipital extremity of the head correspond to those of the various orifices and planes of the pelvis and vagina: the head passing most easily, when the flexion is most perfect, and the cervico-bregmatic circumference more exactly coincident with the orifices of the superior strait, of the uterus, of the inferior strait, and of the vagina.

Here, also, we believe that rotation is fully completed, when the head has entered the inferior strait; the base of the occiput corresponding to the os coccygis, and the parietal protuberances simultaneously passing the rami of the ischium.

There can be no doubt, however, that where the head of the child is small, especially in premature labors, or when the perineum is very distensible, as is often found in multiparous women, deviations and apparent exceptions will be easily detected; the occiput, for example, will often pass obliquely through the inferior strait, or even the orifice of the vagina, rotation not being complete until delivery is accomplished.

In such cases, also, after the occipital protuberance has passed the posterior margin of the inferior strait, the perineum may so readily yield to the bearing-down efforts of the mother as to project directly backward to such a degree as to allow extension to begin within the vagina at the commencement of the fourth period of labor. Thus the anterior fontanel, followed by the upper part of the os frontis, appears under the arch of the pubis, and, eventually, the forehead will be detected at the symphysis; while the occiput rests upon the distended and protruded perineum, and, in this way, will pass out of the os externum vaginae, presenting, in reality, the occipito-frontal diameter to the antero-posterior diameters of the vagina, including its orifice. The anterior fontanel, instead of the posterior, will be found at the centre of the orifice of the vagina. In other words, there will be a change of presentation during the fourth period of labor. During the third period, it was a vertex presentation; the sub-occipital region being at the os coccygis, the anterior fontanel at the pubis, and the posterior fontanel at the centre of the inferior strait. During the fourth period, however, when great relaxation of the perineum exists, extension may begin in the vagina, so that the forehead comes to the symphysis pubis, while the occipital protuberance rests upon the posterior portion of the distended perineum. Hence, the occipito-frontal diameter corresponds to the antero-posterior diameter of the vagina, and, of course, the occipito-frontal circumference and plane are parallel to the successive planes of the vagina, including that of the external orifice.

In a few instances, we have observed this change of presentation in cases of original occipito-posterior positions of the vertex. It, however, is not to be expected, except under the circumstances mentioned, and should not be imitated when artificial delivery is performed. The practitioner should always facilitate flexion until the occiput passes the vulva, when extension should occur in all cases.

From the above account, it will be evident why these occipito-posterior positions are very unfavorable, compared with the occipito-anterior positions. The difficulties to an easy delivery arise from two sources:—

First. From the loss of power caused by the peculiar position of the child, and

Second. From the increased resistances met with by the head during its descent.

First. The diminution of power arises from,

1st. The direction given to the uterine forces in these posterior positions. When the occiput is anterior, the expulsive force being directed through the spine upon the occiput is toward the anterior part of the pelvis, and very soon acts directly upon the soft distensible perineum. In the posterior positions, on the contrary, this force through the spine on the occiput is directed toward the posterior part of the pelvis, so as to impinge the vertex almost at a right angle against the lower portion of the sacrum. This implies necessarily a great loss of power, or perhaps more correctly it demands a great increase of power to force the occiput forward to the coccyx, perineum, etc.

2d. The force of these bearing-down efforts is impaired also by the greater flexion of the whole spine, especially of the cervical position, demanding, therefore, a great accession of power to drive forward the occiput; because the force operates not directly, as in occipito-anterior positions upon the occiput, but indirectly through the curved line of the spine, which becomes more and more curved, as the occiput advances from the sacrum to the coccyx, and from the coccyx to the orifice of the vagina.

Second. The resistances to the descent of the occiput in these posterior positions are comparatively very great; much greater than in the anterior positions. These arise,

1st. From the unyielding character of the posterior portion of the pelvis, against which the head is first impelled.

2d. From the resistance of the posterior perineum, which, although capable of great distension, is, in ordinary cases, much indisposed to protrude directly backward in the direction in which the occiput is forced. This resistance of the perineum may be considered as

continually increasing as the occiput advances toward the vulva, for the curvature of the vagina is constantly augmenting as the occiput has to ascend, as it were, from the bottom or coccygeal portion of the pelvis toward its anterior part, at the arch of the pubis.

3d. The necessity of the greatest possible flexion of the head in these posterior positions very seriously retards the progress of delivery; for this great flexion can only be accomplished by an increase of force. The ordinary degree of flexion takes place when the head is at the os uteri; but, owing to the retention of the os frontis by the pubic bones, a greater degree of flexion is requisite, that the occiput may advance. This is resisted by the descent of the thorax into the cavity of the pelvis, so that the child's chin cannot be directed backward toward the sacrum, but impinges against the sternum. The facial extremity of the head and the upper extremity of the thorax are therefore simultaneously engaged between the pubis and the sacrum. This circumstance, of course, retards flexion, indeed, it necessitates great compression of the chest, and even of the face, in order that flexion may be sufficiently great. It would seem necessary, in some cases, that the neck should be elongated so as to allow the chin of the child to pass from the sternum to the front part of the neck, in order that delivery may be accomplished; in which case the fronto-mental diameter of the face will be engaged with the antero-posterior diameter of the neck, instead of the dorso-sternal diameter of the chest. Much power is demanded to effect these changes.

4th. The occiput must travel the whole of the posterior part of the pelvis, and that of the distended vagina, before it can be liberated at the vulva, a distance of some eight or nine inches, instead of two and a-half or three inches, as in cases of anterior positions. This course of the occiput is not only much longer, but is more difficult, on account of the increasing resistance of the perineum, from the coccyx to the orifice of the vagina.

5th. The adaptation of the form of the head to the passages of the pelvis, is not so accurate as in the anterior positions. This fact is specially to be observed at the inferior strait; the great breadth of the os frontis, when applied to the arch of the pubis, prevents the close approximation of the top of the head to the pubic ligament. Hence, some space is lost under the arch of the pubis, rendering still greater extension of the coccyx and of the perineum requisite for delivery. In the anterior positions, the sub-occipital region, being more narrow, is closely approximated to the sub-pubic ligament.

It is manifest, upon a careful examination, that these resistances are indeed very great, demanding strong

bearing-down efforts, especially in primiparous patients, to overcome them. It is also manifest that, as the direction of the uterine forces, acting through the spine and occiput, is toward the posterior part of the perineum, a greater distension of this tissue and, of course, greater suffering, result. Hence, not only is there more power required and greater delay experienced, but there is also much more danger of injury to the perineum. It is in such cases, therefore, that lacerations of the fourchette and of the anterior perineum, most frequently occur. Indeed, we read not merely of lacerations extending from the orifice of the vagina to that of the rectum, but also of cases where the child's head has perforated the rectum, and been delivered through the anus, with more or less laceration of this orifice, or even that the head has penetrated the perineum on the side of the rectum, and been delivered through a preternatural opening.

Notwithstanding all this may be true, yet these accidents are comparatively rare. Women in health, and of ordinary strength, can deliver themselves in these occipito-posterior positions without assistance, and with safety to their child and to their own tissues. The fourth, therefore, as well as the other occipital positions of the vertex, should be arranged under the head of natural labor.

After the head has been delivered, and the process of extension backward and restitution has occurred, it will be found that the shoulders are usually oblique in the cavity of the pelvis; the left shoulder being opposite to the right foramen thyroideum and the right shoulder toward the left sacro-sciatic foramen. Bearing-down efforts being resumed, rotation of the shoulders will ensue; the left shoulder, playing upon the right anterior inclined plane, will rotate, from the right toward the left, to the pubis, and the posterior shoulder, acting upon the posterior inclined plane, will be rotated, from the left toward the right, to the sacrum; the long diameter of the chest being now coincident with the coccy-pubal diameter of the inferior strait. The head, free from pressure externally, rotates with the shoulders, so that the face, instead of looking toward the left groin, is turned toward the left thigh, and the occiput toward the right. Thus the fifth period will be accomplished precisely as in the occipito-anterior positions, the lateral curvature of the body being on the left side, toward the pubis.

LEFT OCCIPITO-POSTERIOR POSITION.—This fifth position (of Baudelocque) is the reverse of the second. The occiput is toward the left sacro-iliac symphysis, and the top of the os frontis toward the right acetabulum, of course, with the limbs of the child anterior and

to the right, and its dorsum or back posterior and to the left. Hence, also, the right parietal protuberance and the right shoulder and hip will be anterior and over the left acetabulum, or, as it is usually termed, pubic; while the left parietal protuberance, shoulder, and hip will be posterior and over the right sacro-iliac symphysis. This position is less frequent than the fourth; doubtless owing to the sigmoid flexure of the colon, and the commencement of the rectum occupying so much space on the left of the lumbar vertebræ and promontory of the sacrum. Madame Boivin puts it at about 0.45 per cent., while M. Nægelè represents this position as occurring but twice in twelve hundred cases. Judging from our own experience, we should deem this position more frequent; as we have often, by means of the finger, or vectis, facilitated its conversion into the first position. Our friend, Dr. Penrose, the present Professor of Obstetrics in the University of Pennsylvania, informs us that he has lately met with two cases, in rapid succession, of this fifth position of the vertex, in both of which the occiput rotated posteriorly.

The mechanism of labor in this fifth position will be virtually the same as in the fourth position. The observations already made respecting the natural disposition of the occiput to rotate forward in most cases of the fourth position, as demonstrated by Professor Nægelè, will apply with equal force to those of the fifth position: that is, if the occiput strike on the left anterior inclined plane as bounded by the spine of the ischium, it will rotate forward under the arch of the pubis, as in first positions; but if it strike posteriorly to the spine of the ischium, it will rotate backward into the hollow of the sacrum. As the anterior inclined plane is much the longer, these fifth positions most frequently terminate as in original occipito-anterior positions.

In the fifth position, therefore, when the occipital protuberance strikes upon the posterior inclined plane, the mechanism of labor is similar to that of the fourth position. The same diameters of the head will be engaged with the same oblique diameters of the superior strait; with this simple difference, that the cervico-bregmatic corresponds to the right oblique, and the biparietal with the left oblique. (Plate X., Fig. 58.) The first period of labor being accomplished, the head descends during the second period to the inferior strait, rotating so as to get the occiput toward the sacrum and coccyx, and the top of the os frontis behind the pubis, as in the fourth position. But this rotation occurs in the opposite direction, for the occiput now plays upon the left posterior inclined plane, and of course rotates from the left toward the sacrum, while the os

frontis plays upon the right anterior inclined plane, and rotates from the right toward the pubis. (Plate X., Fig. 59.) Should there be any delay, a caput succedaneum may form, as in the fourth position, opposite to the orifice of the vagina; but it will be now situated toward the anterior superior angle of the right parietal bone.

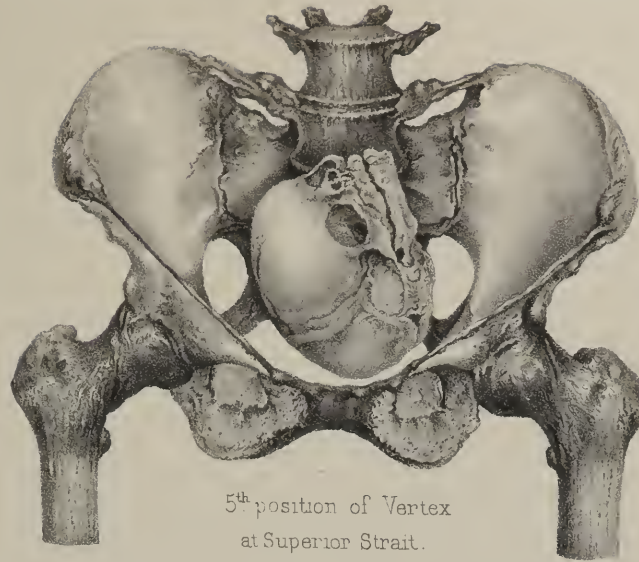
Delivery, therefore, during the second and third periods, progresses precisely as in the former position; the same necessity exists for flexion, compression of the head and chest, and increased distension and elongation of the perineum, until the occiput is delivered over the posterior commissure of the vulva, revolving backward, so that extension now occurs out of the body, and by which the forehead and face successively appear under the arch of the pubis. As soon as the head is completely delivered, restitution ensues from untwisting the neck, but in an opposite direction from what occurred in the fourth position; for the occiput now will be found pointing toward the tuber of the left ischium, and the chin toward the right groin, the occipito-mental diameter again crossing the vulva in an oblique direction from the posterior to the anterior part.

The fifth period, or delivery of the shoulders and body, presents no other peculiarity than the difference in the direction of the rotation. Now the right shoulder on the left anterior inclined plane comes to the pubis, and the left shoulder on the right posterior inclined plane comes to the sacrum; exteriorly, the head also rotates from its oblique position, so as to present the face toward the right thigh, and the occiput toward the left.

As may occur in the fourth position of the vertex, in cases where the head is small, or the perineum relaxed as in multiparous patients, the head may be delivered inferiorly, presenting its sinciput instead of its occiput at the outlets of the vagina; in this case, the occipito-frontal diameter, instead of the cervico-bregmatic, will be concerned.

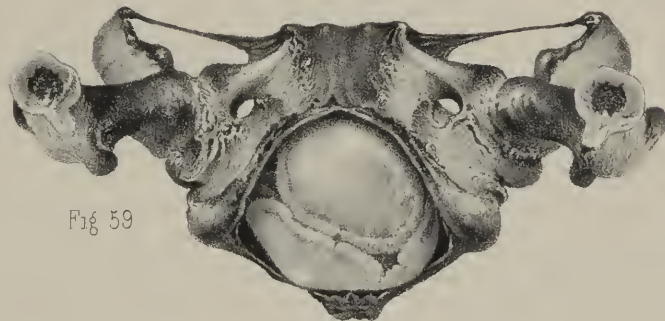
OCCIPITO-SACRAL POSITION.—This sixth position (of Baudelocque) is directly the reverse of the third, the occiput and back of the child being toward the spine of the mother, the top of the os frontis and the limbs being anterior and over the pubis, the right side of the child being toward the left of the mother, and the left side to her right. This position is even more unfrequent than that of the third. Madame Boivin declares that in twenty thousand five hundred and seventeen deliveries she met with but two cases. M. Nægelè has met with two cases in which the head appeared in the third or sixth of Baudelocque, both of which required artificial assistance. Dr. Dewees

Fig 58



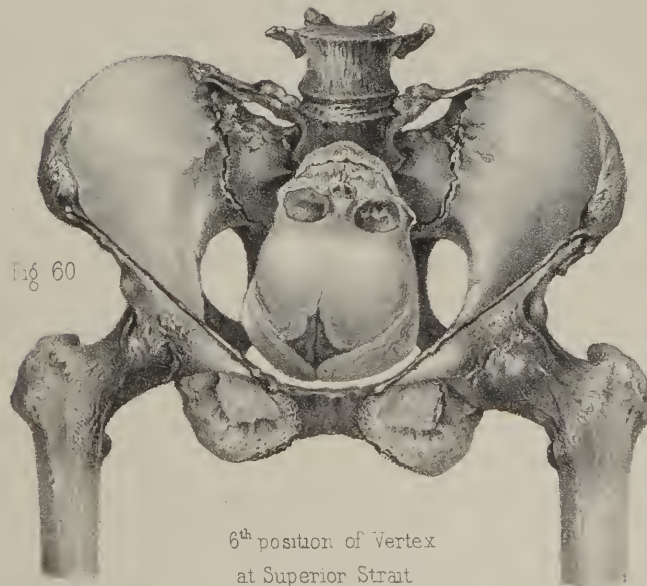
5th position of Vertex
at Superior Strait.

Fig 59



in Cavity of Pelvis.

Fig 60



6th position of Vertex
at Superior Strait

has also observed three cases, and Dr. Meigs two cases. The cause of this infrequency depends upon the great convexity of the occiput, which, when applied to the promontory of the sacrum and to the lumbar vertebræ, will be very readily turned off from the spine to the right, converting it into a fourth position, or to the left, converting it into a fifth position. Hence, although this position may sometimes be observed at the commencement of labor, it usually disappears when the contractions become powerful; still, however, it is occasionally persistent, and its mechanism, therefore, should be studied.

As in the third position, its great peculiarity is, that the cervico-bregmatic diameter, when flexion has been accomplished, is coincident with the short diameter of the superior strait, (Plate X., Fig. 60,) demanding, therefore, more powerful bearing-down efforts to effect its passage; still, when there is a proper proportion between the head and the pelvis, and flexion sufficiently perfect, although there may be some delay, yet there will be no real difficulty, the head descending into the cavity of the pelvis, with its transverse diameter corresponding to those of the canal of the pelvis and vagina. The transit through the superior strait and os uteri, in these cases, is generally simultaneous; the edges of the os uteri being drawn up to the level of the linea iliopectinea during the delay at the first period of labor. During the second, third, and fourth periods, the delivery is accomplished as in the fourth and fifth positions; the top of the forehead is behind the pubis, and the occiput describes the middle line of the sacrum, coccyx, and perineum, to the orifice of the vagina; there being, however, of course, no rotation. The occiput being delivered, extension occurs backward over the perineum, until the forehead and face are completely delivered anteriorly. As there was no rotation, therefore, there will be no restitution; the head remaining in this direct position so long as the shoulders maintain their transverse direction in the pelvis: but, as in the third position, the shoulders will rotate, as

they advance toward the outlet—sometimes the left shoulder rotating toward the pubis, as in the fourth position of the vertex, and sometimes the right shoulder, as in the fifth position of the vertex—in either of which cases, the head turns in a corresponding manner to the left or to the right thigh of the mother.

Such is the mechanism of natural labor in all the various positions of a vertex presentation. The accurate study of the left acetabular position embraces every important point in the occipito-anterior positions, and the study of the right sacral position involves the essential peculiarities of all the occipito-posterior positions.

It has been already intimated that under the first position are to be included all those positions which interest the left anterior inclined plane of the pelvis, and under the second position all those which interest the right anterior inclined plane of the pelvis; inasmuch that, if there be no disproportion between the head and the pelvis, and the expulsive powers be active, rotation will bring the occiput under the arch of the pubis, with more or less facility, according to the original position of the occiput on this inclined plane. When the occiput is near the arch of the pubis, rotation is easily and speedily accomplished, and the spiral motion of the occiput is trifling; but when the occiput plays upon the posterior portion of this inclined plane toward the spine of the ischium, a longer space has to be travelled during rotation, increasing, therefore, the length of this spiral motion, the degree of twist in the child's neck, and, of course, the delay and difficulty. The same thing is true in all the varieties of the second position, where the occiput is near the ramus of the ischium, or far back toward its spinous process. If this representation be correct, and it is supported by most modern accoucheurs, it is unnecessary to speak of transverse, that is, seventh or eighth positions of the head, for, practically, they should be included under the left or right occipito-anterior positions.

CHAPTER IX.

EUTOCIA.—MECHANISM OF LABOR.—PELVIC PRESENTATIONS.

THESE include all those cases in which the pelvis precedes the body and head of the child in delivery. Strictly speaking, according to the definition of a "Presentation," all such cases should be termed *coccygeal*, that is, the coccyx or lower extremity of the foetal ellipse will be found toward the centre of the pelvis. They are, however, so generally known under the name of pelvic presentations, and as there is no inconvenience in the use of this expression, we may persevere in its employment.

These presentations may be considered as regular or irregular. In the *regular* presentation the lower extremities are bent up in front of the body, thus increasing somewhat the antero-posterior diameter of the pelvis; these are usually denominated presentations of the breech or nates. In the *irregular* presentations the feet, knees, or some portions of the lower extremities, precede the pelvis in its descent. Hence, we speak of footling or knee presentations, as modifications or varieties of pelvic presentations.

The *causes* of pelvic presentations are not very evident: reasons have already been detailed why cephalic presentations are far more frequent than pelvic; and these reasons are so strong that it seems singular that pelvic presentations should ever occur.

In the earlier periods of pregnancy, as the embryo floats freely in the liquor amnii, the head will almost always be dependent; but, at the latter periods, especially at the seventh or eighth month of gestation, when there is, comparatively, a smaller portion of the liquor amnii, and, of course, less room to accommodate the motions of the child, it is easily conceivable that if, by any accident, the position of the child in utero should be greatly altered, it may remain permanent until the period of labor. Various causes have been assigned by practitioners for this version of the child in utero, during the latter periods of pregnancy, such as falls or blows interesting the abdominal region of the mother, long confinement to a recumbent position, obliquities of the uterus which often necessitate, at least, a partial alteration of the presentation. Probably, however, the most frequent cause is the spontaneous motions of the child; these, we know, are very

active—in some instances, they are said to be violent; they are often observed by the practitioner during pregnancy, and still more frequently during the first stage of labor, before the membranes are ruptured. It is easy to be conceived, therefore, that if the waters be evacuated, whenever any such spontaneous change in the position of the child had occurred, the tonic contractions of the uterus would maintain it, in this new position; of course, a different presentation would be recognized at the orifice of the uterus.

These presentations of the lower extremity of the ellipse are not only far less *frequent*, but also less *favorable* for the mother and child than presentations of the upper extremity. The causes why they are not so favorable will be better understood after studying minutely the mechanism of labor in such presentations. This study is of great importance, and certainly very interesting to the scientific accoucheur. The advantages which have resulted to the mother and child from a more accurate and minute knowledge of nature's mode of accomplishing delivery without assistance, in pelvic presentations, are immense; for by the old authors and practitioners, and even by many at the present time, such presentations have been regarded as preternatural or abnormal, and, therefore, that in all cases more or less assistance is demanded. This assistance has too often been rendered unscientifically, and in direct opposition to the natural process of labor, so that complications and difficulties of the most serious character have resulted, involving not only merely the safety of the child, but even the integrity of the tissues, the health and life of the mother. Thousands of children have perished from the employment of unnecessary force, or suffered to die from the want of timely scientific assistance. Perhaps the experience of every accoucheur will confirm this remark, and the truth of it seems to be established by the various statistical tables published, giving the results of pelvic deliveries. Thus, it appears that in pelvic deliveries generally about one child in five, or twenty per cent., perishes; while, in cases where assistance is given, the number of deaths is one in two and a half cases, or forty per cent.

So much has our knowledge improved, that there

can, we think, be no impropriety in removing all pelvic presentations from the division of preternatural to that of *natural* labor; for, notwithstanding difficulties and delays may occur, and still-born children will be more frequent in pelvic than in vertex deliveries, yet still in a large majority of cases the woman is fully adequate to accomplish her own delivery with safety to herself and offspring without artificial assistance.

We fully endorse, therefore, the opinion of Baudelocque, in opposition to the general teachings of the profession, that pelvic presentations and all their varieties belong to the class of Eutocia or unassisted labors. We deem this arrangement of great practical importance, for it should be impressed upon the mind of the student and young practitioner, that ordinarily the mother is adequate to her own delivery; and that although many attentions may be demanded to *facilitate* the natural modes of delivery, yet that usually any decided *interference* is pernicious. If, however, the labor be termed "preternatural," and be ranked under the head of "Dystocia," the young practitioner becomes impressed with the idea that the safety of the child, if not of the mother, depends upon *his* active agency, and is thus induced, too frequently, to interfere with nature's operations.

BREECH PRESENTATIONS.

These are far more *frequent* than the other varieties, inasmuch as during pregnancy the lower limbs are almost universally bent up toward the anterior portion of the body,—which flexure of the limbs is necessarily maintained by the contractions of the uterus. They are not only the most frequent, but also the most *favorable*, as will subsequently appear.

In these presentations of the nates, we speak of different positions of the child, according as the sacrum or limbs are opposed to different portions of the mother; the coccyx being always toward the centre of the pelvis. These positions may be divided into two general heads of *sacro-anterior* and *sacro-posterior* positions: the former, like the occipito-anterior positions of the vertex, are more frequent, and probably from similar causes, especially as the convex surface of the dorsum or back of the child accommodates itself to the anterior walls of the uterus, whilst the breadth of the abdomen posteriorly affords more room for the projecting face and limbs. It is supposed also that the weight of the spine has a tendency to give the anterior direction to the back of the fœtus: be this, however, as it may, there can be no doubt that the sacro-anterior positions are far more favorable, as will presently be exemplified.

Each of these grand divisions may be very advantageously subdivided; and, we think, in opposition to most practical authors, that it will be more useful, more accurate and practical to make six positions of the breech, corresponding to Baudelocque's six positions of the vertex. Indeed, we can perceive no fact or argument in favor of having six positions for the vertex which does not apply with as much if not greater force to pelvic presentations; for it is well known that the direct sacro-anterior and sacro-posterior positions of the pelvis occur more frequently than similar positions of the vertex, and although they are often resolved into oblique positions, yet they more frequently remain persistent during the first periods of delivery, and even at the latter periods, involving delay and difficulties at a time when such delays are much more dangerous than in presentations of the vertex.

We do not think, moreover, that the subject is rendered more complicated by increasing the number of positions; for, in the first place, it assists the memory of the student to adopt the same points in the superior strait of the pelvis, and the same positions of the body of the child in all the varieties of cephalic and coeeygeal presentations; and, in the second place, there are certain modifications which it is important to remember in the mechanism of labor, according as the sacrum of the child is originally opposed to one or the other of these six cardinal points of the pelvis.

The learned reader may at first be disposed to criticise the above arrangement as introducing still more confusion than already exists, as to the number of positions adopted by authors. But we trust this confusion will be diminished, not augmented, by the above arrangement, because it is similar to those adopted in the case of vertex presentation; and also it is practically very generally adopted by the best writers, although their artificial division is different. For example, those who adopt Baudelocque's number of four positions of the breech, almost universally acknowledge that in the sacro-posterior position, the hips are not always directly transverse, but very frequently oblique upon one side or the other; thus acknowledging three sacro-posterior positions, each of which demand some modifications of treatment. This is more evident when we come to artificial deliveries: for every one acknowledges that it is of great importance which way the heels or toes point when we bring down the feet; and the practitioner must be influenced by the position of the child, whether its dorsum be on the right or left of the mother, in determining which hand should be employed to bring down the feet. Moreover, those who follow the German division, admitting but two positions of the breech—the right sacro-iliac and the left

sacro-iliac—also acknowledge that modifications exist, whether the sacrum be more to the anterior or posterior part of the pelvis; even M. Nægelè himself speaks of deliveries in which the pelvis passes directly transverse. M. Cazeaux also, although he rejects the sacro-anterior and the sacro-posterior positions, and adopts the German division of the two lateral positions, yet subdivides each of these into three varieties, making, therefore, actually six positions. M. Flamant has gone still further, and taken eight positions of the breech, so as to include all those mentioned by the different authors. We, however, cannot perceive any reason for considering the directly transverse positions as of any importance, as the delivery, in all such cases, will be precisely the same as in an original left or right anterior sacral position. There are, however, modifications of the mechanism of labor demanding peculiar attentions in practice, in cases of the dorso-pubic and dorso-sacral positions.

For these reasons we prefer our own arrangement, as always presenting to the student the six cardinal points of the pelvis, and as impressing upon his mind that modifications of the process of delivery will be observed in each of these six positions, not to be forgotten at the bed-side of his patient.

LEFT SACRO-ANTERIOR POSITION.—The left position, corresponding to the first position of the vertex, has the sacrum opposed to the left acetabulum and the posterior part of the thighs to the right sacro-iliac symphysis. Of course, the dorsum and occiput of the child are anterior and to the left, and the limbs and face of the child are posterior and to the right; and the left hip, shoulder, and parietal protuberance are anterior and to the right, while the right hip, shoulder, and parietal protuberance are posterior and to the left. (Plate XI., Fig. 61.) The sacro-pubic or antero-posterior diameter of the pelvis of the child, which in this case includes the thickness of the thighs, corresponds to the left oblique; and the transverse or long diameter corresponds to the right oblique.

This first position of the breech is far more frequent than either of the others, owing probably to there being more room for the accommodation of the limbs of the child toward the right iliac fossa than on the left side, which is occupied by the sigmoid flexure of the colon.

In studying the mechanism of labor, we have to examine, first, the passage of the pelvis; second, passage of the shoulders; and, third, that of the head. And let it be observed that the difficulties and dangers increase, as these several portions successively become engaged in the passages of the pelvis. This arises

from several causes, which will soon appear; but one may now be mentioned—namely, that in these pelvic deliveries the small extremity of the fetal ellipse descends first, the diameters of the pelvis being comparatively short. Hence, the hips may be delivered, and the shoulders may be retained; or the shoulders may pass, and yet a dangerous or even fatal delay may occur before the head is delivered; in vertex presentations, on the contrary, the head being delivered, the shoulders and hips are easily transmitted.

In deliveries of the breech, the first stage of labor being completed, the contractions of the uterus may soon rupture the bag of waters; and, the liquor amnii being discharged, the whole force of the expulsive efforts act directly on the child: the necessary consequence of this pressure is to increase and perfect the elliptical form of the fœtus in proportion to the degree of the bearing-down efforts. Hence, the limbs of the child are firmly compressed toward the anterior part of the body, while the head, formerly in a state of semi-flexion, has this flexion greatly increased; the chin is firmly pressed upon the sternum by the great force applied through the medium of the fundus of the uterus on the top of the child's head, as the long arm of the lever extending from the chin to the foramen mag-

Fig. 34.



Fœtal Ellipse.

num and atlas, necessitates this descending motion of the face toward the breast of the child; the head being

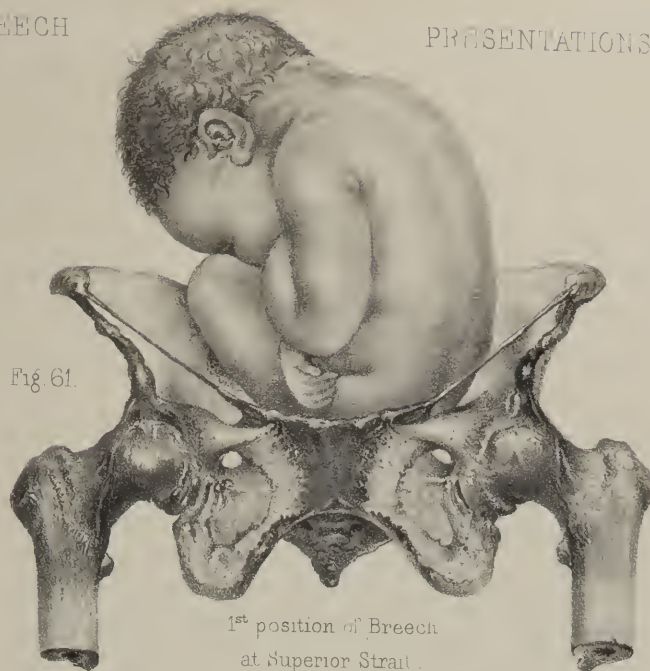


Fig. 61.

1st position of Breech
at Superior Strait.



Fig. 63

1st position
of Chin
in Cavity of Pelvis

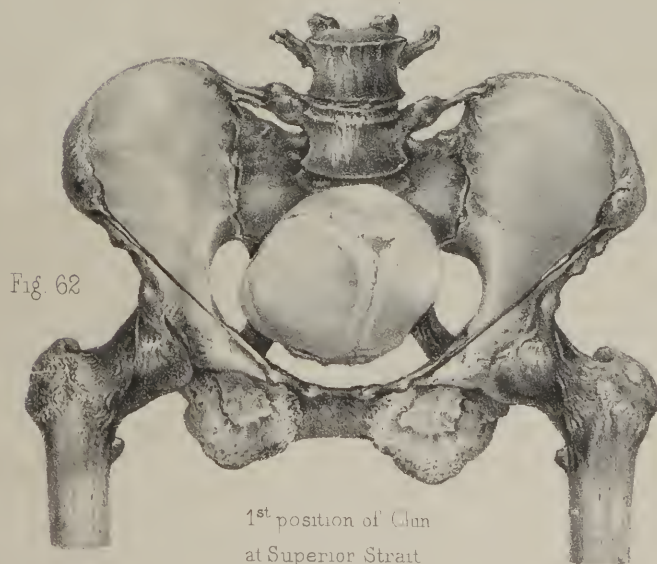


Fig. 62

1st position of Clun
at Superior Strait



resisted by the cervical vertebræ, acting as a fulcrum or prop.

This important fact of the increased flexure of the body, and especially of the head, should be regarded as of fundamental importance in cases of pelvic deliveries, never to be forgotten by the practical accoucheur.

Here, therefore, as in vertex presentations, the primary influence of the contractions of the uterus is to increase *flexion*. This being accomplished, the pelvis presents, in the manner already mentioned, with its diameters corresponding to the oblique diameters of the superior strait and, of course, of the os uteri.

Diagnosis.—At this first period of delivery of the hips, on examination per vaginam, the practitioner may recognize the sulcus or fissure between the nates, running diagonally from left to right across the pelvis—the spinous processes of the sacrum can be felt within the os uteri, opposed to the left anterior inclined plane. The posterior part of the thighs will be opposite to the left sacro-iliac symphysis, a deep fissure indicating the separation of the two limbs; while toward the right anterior inclined plane, and generally opposite to the obturator foramen, he can recognize the left hip, by the soft character of the buttock, and also by passing the finger into the groin, where he will feel the soft but resisting anterior surface of the thigh, the margin of the os ilium, and the superior and inferior spinous processes separated by a notch; and toward the centre of the pelvis will be felt the os coccygis opposite to the coccygeal plane of the mother's pelvis, (Plate III., Fig. 14.) The diagnosis is further assisted, in some cases, by recognizing the organs of generation and the anus. The discharge of meconium or dark-colored mucus from the intestine is considered as confirmatory of a pelvic presentation; but no confidence should be placed in this circumstance, as such discharges may occur under almost any presentation.

The diagnosis of pelvic presentations can occasionally be established before the os uteri is dilated, or even during the latter periods of pregnancy. On external examination, when the woman is somewhat emaciated, the head of the child can be perceived toward the fundus of the uterus, indicating that the pelvis is toward the cervix; while, by auscultation, the pulsations of the foetal heart, instead of being perceived toward the lower portions of the uterus, will be detected nearer the fundus. Nevertheless, too much dependence must not be placed on these measures; for, as Dr. Tyler Smith observes, the difference of location of the thorax, and, of course, of the heart, does not vary very materially, whether the presentation be cephalic or pelvic.

Delivery of the Pelvis.—Presenting in the manner

just described, the pelvis very universally passes parallel to the superior strait, and even the os uteri, without much delay, owing to its comparative small size. Nægèlè, however, believes that here, as in cases of vertex presentations, there is a lateral obliquity; in other words, that the left or pubic tuber of the ischium descends first through the plane of the superior strait. The objections to this opinion, as already mentioned, in speaking of the descent of the head in vertex presentations, apply also to the descent of the pelvis; for, although from the slight depth of the anterior portion of the pelvis, the left hip appears to be comparatively low, yet, if we bear in mind that the coccygeal region forms the real base or bottom of the pelvis, the right or sacral hip will be found as far advanced as the left or pubic. Nevertheless, owing to the small size of the pelvis, the exceptions to this rule may be numerous, so that the pelvis may have this lateral obliquity in its descent in very many instances, precisely as the head, when small, may pass obliquely through the superior strait, or os uteri; but, in cases of much resistance or delay, the parallelism, in either case, becomes more and more perfect.

During the *second period* of this stage of labor the pelvis usually descends rapidly from the os uteri to the floor of the pelvis, and then pressing on the coccyx and posterior perineum is directed to the inferior strait. During this process of descent, rotation of the hips occurs in a manner very analogous to that of the head: the left hip, as represented by the trochanter major of the thigh, playing on the right anterior inclined plane of the pelvis, is directed toward the symphysis pubis; while, of course, the left trochanter major, acting upon the posterior inclined plane, is directed toward the sacrum. Thus, by this act of rotation, the oblique character of the pelvis is changed into the direct—one hip being to the pubis, the other toward the sacrum, and the posterior part of the thighs toward the right plane of the ischium, and the sacrum toward the left plane of the ischium. We say, therefore, that the left hip rotates from the right toward the left anteriorly, and the right hip from the left toward the right posteriorly. It very generally happens, while the hips thus rotate from the oblique to the direct position, that the shoulders of the child remain oblique, necessitating, therefore, a twist in the loins—greater or less, according to the obliquity of the hips and the stationary character of the shoulders.

By the time this is fully accomplished, in primiparous labors, the hips are fairly engaged in the inferior strait of the pelvis, and the *third period* commencing, the finger will now recognize the left trochanter and groin at the sub-pubic ligament, the right trochanter

and groin toward the os coccygis, the thighs toward the right tuber of the ischium, and the sacrum toward the left tuber. Hence, the transverse diameter of the pelvis now corresponds to the coccy-pubic, or long diameter of the inferior strait; while the antero-posterior diameter of the pelvis corresponds to the bis-ischiatic. Hence, the pelvis of the child passes perpendicularly through the plane of the inferior strait of the pelvis of the mother.

During the *fourth period* the child's pelvis passes through the canal and orifice of the vagina, to be delivered externally. During this period, the uterine forces, operating in the direction of the axis of the superior strait of the pelvis, impel the nates directly against the perineum, causing its distension and prolongation, as occurs in vertex presentations. Hence, the direction of the child's pelvis is continually altered by the resistance of the perineum: the right hip is thus made to describe a curved line on the posterior surface of the vagina to the commissure of the vulva; while the left hip, firmly pressed against the arch of the pubis, remains nearly stationary, affording a centre on which the posterior hip revolves. Hence, also, analogous to what occurs in vertex presentations, the pelvis descends perpendicularly to the different planes of the canal of the vagina, including that of its external orifice. At this point, as soon as the disten-

of the pubis, and thus the delivery of the pelvis is completed.

During this process of descent of the pelvis through the vagina, there must be a lateral curvature in the body of the child, on its left side toward the pubis, inasmuch as the shoulders, being still in the pelvis, are more or less in the axis of the superior strait, while the hips are passing out perpendicularly to the planes of the vagina. This lateral flexion of the body is greater or less in proportion to the rigidity and resistance of the perineum: of course, it is diminished, and rapidly disappears as the right hip, when delivered, revolves back toward the perineum and coccyx.

As soon as the pelvis is delivered, in the manner just mentioned, the sacrum will be found to the left thigh of the mother, and the limbs of the child to the right thigh; but, very quickly, the hips being free from pressure, resume their original oblique position; in other words, restitution ensues. The spine of the child now presents obliquely toward the left groin, and its abdomen toward the right tuber of the ischium.

This completes the fourth period of the second stage so far as the hips are interested. We believe, in opposition to the statements of Prof. Nægèlè, that rotation of the hips is generally completed, especially in primiparous patients, at the time the hips pass the inferior strait. If the child, however, be small, and especially if the perineum be relaxed, rotation is not perfect, and the hips may then pass out obliquely at the inferior strait, and if there be great relaxation, even obliquely, also, at the orifice of the vagina; but, if the child be of the ordinary size, and especially if the tissues of the mother be rigid, as in first labors, rotation is more complete, one hip coming directly to the pubis, and the other to the coccyx and perineum. Here, therefore, as in a vertex presentation, the greater the resistance the more complete the rotation. Nevertheless, as the child's pelvis is comparatively small, imperfect rotation is more frequently met with in pelvic than in cephalic deliveries.

Delivery of the Shoulders.—The passage of the shoulders through the pelvis and vagina is accomplished precisely in the same manner as the delivery of the pelvis, except that, being larger, there may be more delay, and there is more liability to complications.

It is of importance to remember that the contractions of the circular fibres of the uterus closely approximate the arms of the child to its chest, and the stronger, therefore, the contractions, the more closely will be this approximation. Hence, in the passage of the thorax through the superior strait or os uteri, we may expect the arms of the child to descend with the thorax, before the shoulders become engaged; the elbow

Fig. 35.



Lateral Curvature of the Body.

sion is sufficiently great, the posterior commissure of the vulva glides over the right hip to the side of the child; and the left hip rapidly passes under the arch

being usually recognized on either side toward the inferior portion of the thorax. Velpeau believes that the arms will thus descend in almost every case, provided no traction be made. He gives the credit of establishing this fact to Wiedemann, in opposition to the previously received opinion that the arms will remain elevated along the sides of the head in pelvic deliveries. This idea seems even to have been countenanced by Baudelocque, who states that the arms often rise, but owing to the compressibility of the shoulders, they descended readily; but Desormeaux and Madame Lachapelle, as well as Velpeau, confirm the opinion of Wiedemann as to the descent of the arms with the thorax in natural labors. This is our own experience, and, we believe, that of the profession at the present time. The elevation of the arms, therefore, will be considered under the head of Dystocia or Complicated Labor.

There is usually no great resistance until the shoulders descend to the os uteri, presenting, as already mentioned, their long diameter to the right oblique of the pelvis. The bearing-down efforts expel the shoulders through the os uteri and the cavity of the pelvis to the inferior strait, in a perpendicular direction to the various planes. At the same time, rotation of the left shoulder occurs upon the right anterior inclined plane, to the pubis, and the right shoulder on the left posterior inclined plane, to the sacrum. The head very universally maintains its original oblique position; hence, this rotation of the shoulders necessitates twisting in the neck of the child. During its transit through the inferior strait and through the elongated vagina, the left shoulder is firmly pressed against, and to a great degree rendered stationary at the arch of the pubis, upon which, as a centre, the right shoulder passes from the coccyx over the posterior surface of the vagina to the commissure of the vulva. Here, analogous to what occurs in the delivery of the nates, the left shoulder appears first at the pubis, but there, remains while the perineum passes over the right arm, and the right acromion process, and slides to the neck of the child. The shoulders are thus delivered, one directly toward the pubis and the other toward the perineum, the spine of the child toward the left thigh and the thorax toward the right thigh. Immediately, however, restitution here also occurs; the neck being untwisted after the delivery of the body. Hence, the left shoulder now points toward the right groin, and the right shoulder toward the left tuber ischii; the long diameter of the chest crossing the vulva obliquely from before backward, and from the right toward the left. The questions, as to the obliquity of the shoulders, and the degree of rotation which

ensues, have been agitated in the same manner as in the delivery of the nates. They are not of much importance, but may be answered in a similar manner,—the larger the chest and the greater the resistance of the perineum, the more complete is the rotation of the shoulders. It will be found, also, that complete rotation of the chest occurs more frequently than that of the hips, owing to its comparatively greater dimensions.

Delivery of the Head.—Before this process of delivery of the shoulders is fully consummated, the head of the child has usually passed through the superior strait and os uteri; and it will be found, therefore, in the cavity of the pelvis.

The transmission, however, of the head through the superior strait and os uteri is affected upon principles which should be carefully studied. The powerful expulsive efforts of the mother acting upon the body of the child, through the medium of the head and the spine, necessarily keep up and increase the flexion of the head; the cervical vertebræ being a prop or fulcrum partially resisting the descent of the posterior portion of the head, and thus facilitating the approximation of the chin of the child to its breast. The head, therefore, may be regarded as a lever of the first kind, the short arm of the lever being posterior and the long arm of the lever extending from the spine to the chin being anterior. The necessary result is, that the small extremity of the head—the mentum or chin—is brought to the centre of the pelvis, and constitutes, therefore, the presenting part of the head.

We have a right to say, therefore, that in pelvic presentations, when the process goes on naturally, there is a *presentation of the small extremity* of the ovoid of the head, which involves the important fact that we have the same short diameters of the head concerned as in presentations of the vertical or greater extremity of the head. For it follows that when the chin is toward the centre of the os uteri, or superior strait, it points toward the coccygeal region, and therefore the posterior fontanel, or vertex, points to the fundus of the uterus. (Plate XI., Fig. 62.) Hence, the occipito-mental diameter is coincident with the axis of the uterus and that of the superior strait. It will be found also that the left parietal protuberance is toward the right acetabulum, and the right parietal protuberance toward the left sacro-iliac symphysis, and therefore the bi-parietal diameter is parallel to the right oblique; while the base of the occiput or nape of the neck will be opposite to the left acetabulum, and the anterior fontanel or apex of the head toward the right sacro-iliac symphysis. Thus the cervico-bregmatic diameter will correspond to the left oblique diameter, and, of course, the

cervico-bregmatic circumference of the head will be parallel to the plane of the superior strait. Hence, delivery through the superior strait and os uteri, in cases of presentation of the chin, is affected precisely in the same manner as in vertex presentations, and, we may say, with as much facility, provided the flexion be perfect; for the same diameters are concerned as regards the head of the child and pelvis of the mother, there being really, mechanically speaking, no difference whether the head presents its occipital or mental extremity at the superior strait. (Plate IV., Figs. 26 and 27.) It is advantageous also to observe that just in proportion to the resistance to the descent of the child through the pelvis, will be the degree of flexion arising from the comparative fixation of the cervical vertebræ and the powerful pressure from above upon the head of the child; and, of course, the more accurate will be the parallelism of the diameters of the head to those of the superior strait. In very many instances, however, where the head is small, and where the os uteri is much relaxed as in multiparous women, the head readily passes imperfectly flexed, presenting, for example, the cervico-frontal diameter instead of the cervico-bregmatic to the left oblique; the apex of the forehead pointing toward the right sacro-iliac symphysis, and occiput toward the left acetabulum. But in primiparous labors, and even in all cases where there is much resistance, flexion continues to increase until the cervico-bregmatic diameter is involved.

There can, we think, be no reasonable doubt of the truth of the views now presented, or of their great importance in a practical point of view. Indeed, they seem to be generally received and acknowledged; yet we are surprised to find that M. Cazeaux speaks of the head as passing through the superior strait with the occiput toward the left acetabulum, and the forehead toward the right sacro-iliac symphysis. In other words, he represents the occipito-frontal diameter and, of course, the occipito-frontal circumference instead of the cervico-bregmatic diameter and circumference as being concerned at the superior strait, which would necessarily involve delay and danger in the process of delivery, as will be hereafter noticed, when speaking of the complications of labor in pelvic deliveries.

The head, thus having passed through the os uteri in an oblique direction, descends into the cavity of the pelvis. (Plate XI., Fig. 63, and Plate XXIX., Fig. 142.) It is now completely out of the uterus, whose contractions therefore no longer assist in its delivery. The bearing-down efforts, however, of the mother, effected by the abdominal muscles and the diaphragm, cause the base of the occiput to strike the anterior inclined plane on the left side, and to turn, therefore, from the

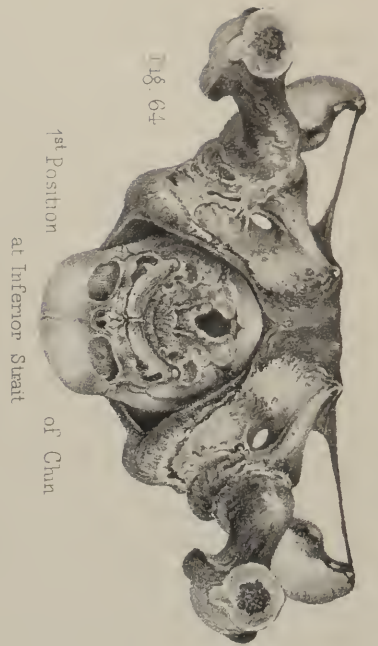
left toward the right, *behind* the bodies of the pubes, while, of course, the forehead passes in the opposite direction posteriorly, from the right toward the left, to the sacrum and coccyx; rotation is thus accomplished,—the head, as in vertex presentations, describing a spiral turn greater or less, according to the degree of its original obliquity.

As the body of the child is completely delivered, it rotates externally with the head, so that its posterior surface, instead of being directed toward the left groin, is now found toward the pubis, and its anterior surface toward the perineum.

The head being now at the inferior strait, (Plate XII., Fig. 64, and Plate XXIX., Fig. 141,) the nape of the neck, or base of the occiput is under the sub-pubic ligament, and the anterior fontanel toward the os coccygis. The cervico-bregmatic diameter is now parallel to the coccy-pubic diameter of the inferior strait, and the left parietal protuberance will be found toward the right tuber ischii, and the right protuberance toward the left tuber, causing the bi-parietal diameter to be parallel to the bis-ischiatic: while the vertex points to the upper part of the sacrum, and the chin of the child rests upon the perineum toward the centre of the inferior strait; so that the occipito-mental diameter then corresponds to the axis of this strait. The head, therefore passes perpendicularly through the inferior strait, with the same facility as in vertex presentations, the same diameters are concerned, and, mechanically, it makes no difference whether the chin or the occiput first approximates the vulva.

These changes effected in the direction of the head during the passage from the superior to the inferior strait of the pelvis, are the result of a continued *flexion* of the child's head: for, though the flexion was great when the head passed the os uteri, yet after the delivery of the body the breast or sternum is necessarily removed further and further from the chin; in other words, extension of the head occurs, not by the motion of the head, but by that of the body of the child. Under these circumstances, as the head descends, flexion again ensues from two causes—first, from the resistance of the coccyx and perineum, by which the whole face is turned more and more forward in proportion to the rigidity of the perineum, and, secondly, by the fact that the occiput being behind the pubis is there arrested. Hence, the bearing-down efforts of the mother are directed upon the front part of the child's head, which, therefore, is forced along the posterior wall of the vagina, revolving upon the base of the occiput under the arch of the pubis, as its centre, and thus the chin of the child approximates more and more toward its breast.

PELVIC PRESENTATIONS



1st Position
at Inferior Strait
of Chin



at orifice of Vagina

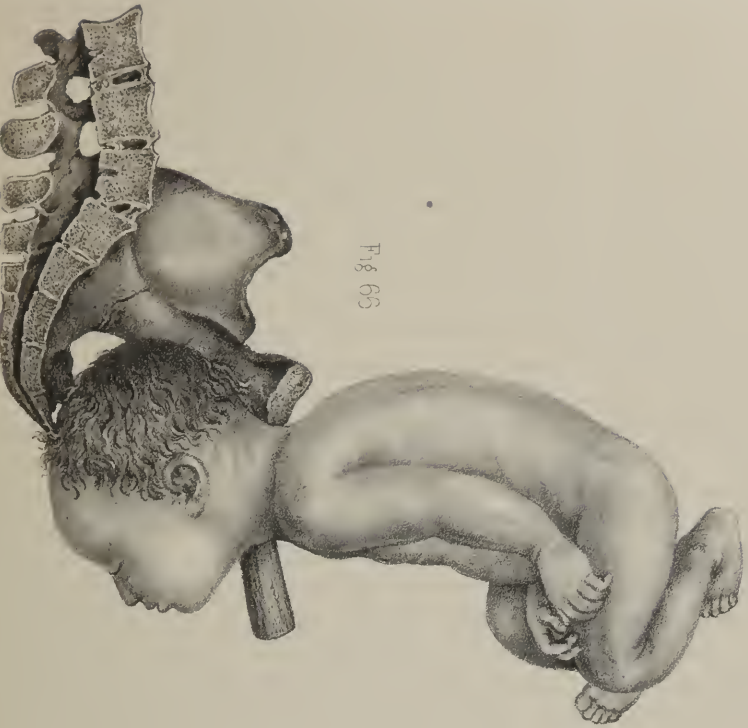


Fig 66

Body carried upwards

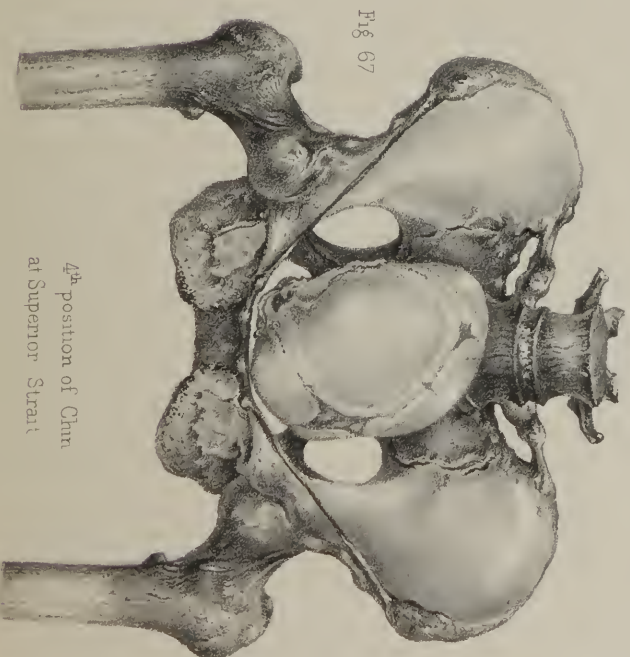


Fig 67

4th position of Chin
at Superior Strait



The head thus passes perpendicularly not only through the inferior strait but through the various planes of the canal of the vagina, including that of the external orifice. Hence, when it passes this orifice, (Plate XII., Fig. 65,) the nape of the neck will be found under the arch of the pubis, the anterior fontanel at the posterior commissure of the vulva, and the parietal protuberances on either side, so that the cervico-bregmatic circumference is now parallel to that of the orifice of the vagina. It will also be found that the chin, closely approximated to the breast, corresponds to the centre of the orifice of the vagina, and the occipito-mental diameter to the axis of this opening.

Thus, if the delivery be perfectly natural, if no traction be made upon the body of the child, and if it be expelled simply by the bearing-down efforts of the mother, it will be found that the child presents its chin at the superior strait, the orifice of the uterus, the inferior strait, and finally at the external orifice of the vagina; and, hence, that the cervico-bregmatic circumference is parallel to the planes of these various orifices, and also to the intermediate planes during the whole process of delivery,—the head of the child describing, as in cases of vertex presentation, the curved axis of the obstetric canal. (Plate V., Fig. 39.)

Notwithstanding, therefore, all that has been written and taught respecting pelvic presentations, and although they have been so very generally arranged under the head of preternatural labors; nevertheless, as regards their mechanism, they may be considered as easy as presentations of the occiput, and therefore should be arranged under the head of natural labors—the pelvis and shoulders being comparatively small, are transmitted without peculiar difficulty, and the head, when in a state of flexion, *presenting the chin*, must pass as readily as when the vertex presents, for precisely the same diameters are concerned in one case as in the other. It is true, however, that pelvic presentations are more readily complicated; and when delays occur, the safety of the child is much more jeopardized, as will be presently detailed.

RIGHT SACRO-ANTERIOR POSITION.—In this case, which corresponds to the second position of the vertex, the sacrum is opposite to the right acetabulum, and the posterior portion of the thighs to the left sacro-iliac symphysis; the right hip, right shoulder, and right parietal protuberance will now become pubic, and are over the left acetabulum; while the left hip, left shoulder, and left parietal protuberance will be over the right sacro-iliac symphysis, and therefore may be termed sacral. It is manifest in this case that the diameters of the pelvis correspond to the same diameters of the supe-

rior strait as in the first position of the breech; the only difference being that the right extremity of the transverse diameter of the pelvis now corresponds to the left acetabulum, and the sacral extremity of the antero-posterior diameter to the right acetabulum.

It is evident, therefore, that the mechanism of labor must be precisely as in first positions of the breech, with the exception that *rotation* must occur in a different direction—thus, after the hips have passed through the os uteri, the right hip playing upon the left anterior inclined plane will be rotated, from the left toward the right, anteriorly to the pubis, and the left hip playing upon the right posterior inclined plane will rotate from the right toward the left, posteriorly to the sacrum and coccyx; the right hip, therefore, in this case, will be pubic and the left hip sacral,—the reverse of what occurred in the first position. Hence, also, after the delivery of the pelvis at the os vaginae, the right hip will be toward the symphysis pubis and the left toward the perineum; but as soon as the limbs are delivered, and the pelvis free from pressure, *restitution* immediately ensues from the untwisting of the loins; then the right hip will be opposite to the left groin, and the left hip opposite the right tuber of the ischium. The pelvis thus becoming again oblique, as the shoulders are still oblique in the cavity of the pelvis. It is manifest, also, that the lateral curvature of the child's body, which must necessarily occur in the pelvis and vagina, will be now on the right side toward the pubis, and not upon the left, as occurs in first positions.

In the same manner the shoulders are also delivered, the right shoulder rotating in the same way toward the pubis, and the left toward the sacrum; and after being delivered, the right or pubic shoulder soon points toward the left groin, and the left shoulder toward the right tuber of the ischium—owing to the occurrence of restitution from the untwisting of the neck of the child.

The delivery of the head also occurs precisely as in first positions, with the exception that the occiput now plays upon the right anterior inclined plane, and rotates from right to left anteriorly behind the pubis; while the forehead rotates posteriorly from left to right on the left posterior inclined plane toward the sacrum and coccyx. The rest of the labor is as in first positions.

In practice, it is important to bear in mind these points of difference as regards the rotation of the hips, shoulders and head, upon the opposing inclined planes of the pelvis.

SACRO-PUBIC POSITION.—This position, which corresponds to the third of the vertex, has the sacrum to-

ward the vertebræ, and the right hip, right shoulder, and right parietal protuberance to the left side, and the left hip, shoulder, and parietal protuberance to the right side of the mother. The transverse diameter of the pelvis now corresponds to the bis-iliac, while the antero-posterior diameter of the pelvis now corresponds to the short or sacro-pubic diameter of the superior strait. This position of the breech is by no means uncommon; indeed, practical authors often include all the sacro-anterior positions under the one general head of sacro-pubic position. The cause of this frequency is apparent; the sacro-pubic diameter of the child is small, and, although the thighs are bent up in front of the body, yet the lumbar vertebræ and promontory of the sacrum may readily project between them, and thus serve to fix the body in this position.

Therefore, in the first period of delivery, as the diameters of the pelvis correspond favorably to those of the superior strait, the descent of the nates can be readily accomplished through this opening and the os uteri, down to the coccygeal region or bottom of the pelvis. At this time, on examination per vaginam, the spinous processes of the sacrum will be directly opposed to the os vaginae, while the os coccygis of the child will be opposed to that of the mother; the long diameter of the hips being transverse; but, although the pelvis of the child is apparently so near delivery at the vulva, it is still in the cavity of the mother's pelvis, it has not entered the inferior strait; before this is fully accomplished rotation of the hips must ensue—either the left toward the pubis, as in first positions, or the right in an opposite direction to the pubis, as in second positions. *A priori*, it cannot well be determined which of these changes will occur, as the body is forced down against the perineum; they seem to depend upon some accidental cause, as, for example, a little prior obliquity of the hips, so that one is more in advance toward the pubis than the other, or upon some condition of the rectum, as it pursues its course upon the left of the median line of the sacrum, whether it be empty or be distended with gascous or feculent matters. But whichever way rotation occurs, delivery is accomplished precisely as in original first or second positions of the breech, with one hip to the pubis, and the other to the sacrum. There is, however, in such cases, a greater twist in the loins; as the pubic and sacral hips, which were transverse, have to describe a longer spiral curve during their approximation to the pubis anteriorly, or to the sacrum posteriorly, which may amount to ninety degrees—a quarter of a circle. It is hardly to be supposed, however, that the lumbar vertebræ will permit such an extent of rotation: hence, during this rotation of the hips, there is generally a

partial rotation of the shoulders; in other words, when the left hip, for example, has reached the arch of the pubis, the shoulders are no longer transverse at the superior strait, but have become oblique—the left toward the acetabulum, and the right toward the sacro-iliac symphysis, as in original first positions of the breech. The reverse occurs when the right hip becomes pubic, as in second positions of the breech—the right shoulder being then to the left acetabulum, and the left shoulder toward the right sacro-iliac symphysis. Hence, when the hips are delivered at the vulva, restitution, perhaps, very seldom brings the pelvis back to its original transverse position, but it remains somewhat oblique according to the degree of twist which has actually occurred in the loins of the child.

Delivery of the shoulders is generally facilitated by this rotation of the hips, giving obliquity to the thorax as it passes through the pelvis. If, however, they should appear transversely in the cavity of the pelvis, they will not remain so, but will gradually rotate as they approximate the outlet, following almost invariably the direction in which the hips rotated; so that if the left hip becomes pubic, the left shoulder will also become pubic, and the reverse, if the right hip rotates toward the pubis.

In consequence of these rotations of the pelvis and shoulders, a very favorable change occurs also in the position of the head at the superior strait; for, notwithstanding the great flexibility of the neck, it is hardly probable that the head will remain with the occiput directly anterior when either one or the other shoulder has been turned round to the pubis, as this also would necessitate a degree of rotation to be permitted by the neck equal to a quarter of a circle, in which case the occiput would correspond to one shoulder, and the chin to the other shoulder. It is probable, therefore, that, to a certain extent, the head rotates with the shoulders to one side or the other. This early rotation of the head is further facilitated, and very generally completed by the projection of the lumbar vertebræ and promontory of the sacrum, acting upon the top of the os frontis, and turning the forehead to the right or left side; that is, converting this third position of the chin into a first or second position, when, of course, delivery will occur, as if these favorable positions had originally existed.

Nevertheless, it may happen from some peculiar circumstances, that the head may remain at the superior strait, with the os frontis toward the promontory of the sacrum, and the base of the occiput toward the pubis. Even in such cases, the woman may deliver herself, although the short diameter of the superior strait is concerned: for, under the powerful bearing-down efforts

of the mother—the descent of the occipital region of the head being resisted by the bodies of the pubes and by the cervical vertebræ—the face will be forced downward; in other words, flexion will be increased, the chin will approximate to the centre of the pelvis, so that we will again have the cervico-bregmatic diameter measuring but three and a half inches, corresponding to the sacro-pubic diameter measuring four inches, while the occipito-mental diameter coincides with the axis of the superior strait. The head, therefore, can pass in this perpendicular manner through the superior strait into the cavity of the pelvis, when no further difficulty will exist, but delivery be accomplished as in other varieties of chin presentation.

RIGHT SACRO-POSTERIOR POSITION.—This is the reverse of the first, and corresponds to the fourth position of the vertex: the sacrum being to the right sacro-iliac symphysis, and the posterior part of the thighs to the left acetabulum. The same diameters, therefore, in the pelvis, shoulders and head, will correspond to the same oblique diameters of the superior strait, as in the first position of the breech; but as the back of the child is now posterior instead of being anterior, as in the latter case, the right extremity of the transverse diameter of the pelvis will now be toward the right acetabulum, and the left extremity toward the left sacro-iliac symphysis, the reverse of what occurred in the first position. The child, in this fourth position, presenting, therefore, the same diameters, will pass readily through the superior strait and the dilated os uteri, to the inferior strait, as already described in speaking of the first position; excepting, that the right hip now becomes pubic in consequence of rotation. So, also, there is nothing peculiar in the delivery of the hips and shoulders in the inferior strait and os vaginæ, excepting that the lateral flexure of the body now occurs upon the right side toward the pubis.

In the delivery of the head, however, there is often much peculiarity, and generally more difficulty. If no improper traction be made upon the body of the child, the expulsive forces will, as in similar cases, increase the flexion; so that the chin will be brought to the centre of the pelvis, and thus the anterior fontanel will be found behind the left acetabulum, and the cervix behind the right sacro-iliac symphysis; (Plate XII., Fig. 67;) here, therefore, we have favorable diameters, the cervico-bregmatic and bi-parietal corresponding to the oblique diameter of the superior strait and os uteri, and the occipito-mental corresponding to the axis of the superior strait. Of course, therefore, the head passes perpendicularly into the cavity of the pelvis.

During the second period of delivery, rotation of the

head is observed in a manner very similar to what occurs in a vertex presentation; thus not unfrequently—M. Nægelè, followed by M. Cazeaux, etc., would say very universally—the occiput rotates on the right anterior inclined plane, from the sacro-iliac symphysis to the pubis, so as to bring the occiput behind the pubis, as in original anterior positions. This rotation is partly effected by the previous rotation of the hips and shoulders toward the pubis, giving a tendency to the forward rotation of the occiput—but the chief explanation of this fact is, as in vertex presentations, that, if the occiput strikes anterior to the spine of the ischium, of course it will be determined forward by the right anterior inclined plane of the pelvis; yet, it sometimes strikes posterior to the spinous process of the ischium; it will then sink into the sacro-sciatic notch, and hollow of the sacrum, rotating backward on the right posterior inclined plane. (Plate XIII., Fig. 68, and Plate XXIX., Fig. 144.) In all the former instances, therefore, although there may be some delay from the extent of the spiral curve, which the occiput must describe on the anterior inclined plane until it gets behind the symphysis pubis, yet the delivery will be the same as in original cases of the second position of the breech; since the fourth position has, by this rotation, been virtually converted into the second. The remark is important, that this rotation of the occiput from the posterior to the anterior position very frequently occurs, as M. Cazeaux has observed, after the delivery of the shoulders; and even when restitution of the shoulders had brought the sternum of the child obliquely forward toward the left groin.

But in those cases where the occiput rotates posteriorly into the hollow of the sacrum, the superior portion of the os frontis, playing upon the left anterior inclined plane of the pelvis, rotates from left to right anteriorly, so as to get under the arch of the pubis, and the whole head soon becomes fairly engaged in the inferior strait of the pelvis; (Plate XIII., Fig. 69, and Plate XXIX., Fig. 143;) while the body of the child, being delivered, will also rotate, so that its back will correspond to the perineum, and its abdomen to the anterior surface of the mother. A careful examination will now show that the base of the occiput or nape of the neck is toward the os coccygis, and the anterior fontanel will be toward the symphysis pubis; and, therefore, the cervico-bregmatic diameter will correspond to the coccy-pubic diameter of the inferior strait, while the parietal protuberances being toward the tubers of the ischia, the bi-parietal diameter will coincide with the transverse diameter, and the occipito-mental diameter will be coincident with the axis of the inferior strait.

Bandeloeque confirms this account in his excellent history of the Mechanism of Labor, where he states that the chin descends behind the left acetabulum, and rotates toward the vulva, and then the *top of the head* will be found *under* the pubis. Thus, the "sub-occipito-bregmatic" circumference corresponds to the plane of the inferior strait.

Those who do not accurately watch the progress of labor may deem this observation incorrect; inasmuch as, when rotation has occurred, the forehead, or anterior part of the os frontis, instead of the anterior fontanel, is sometimes found at the symphysis pubis, and the cervico-frontal diameter extending from the coccyx to the pubis. This is by no means infrequent; but, in such cases, the head is not fairly in the inferior strait,—more flexion is required,—so that while the chin approximates the breast of the child, the forehead advances under the arch of the pubis, the anterior fontanel appears under the sub-public ligament, and the parietal protuberances will now be found corresponding to the sides of the arch; the head is now fairly engaged in the inferior strait in the manner above described.

Let it be remarked that, owing to the breadth of the top of the head, it cannot come in contact with the sub-public ligament, and therefore some space is lost, necessitating usually some delay at this juncture, and a greater extension of the os coccygis posteriorly, so as to increase the coccy-pubic diameter. At this stage, the perineum, which, after the delivery of the body, had slipped to the posterior part of the neck, is now pushed backward and compressed toward the sacro-iliac ligaments and coccyx; it forms, therefore, a centre, on which the superior part of the head revolves in its passage from under the arch of the pubis. The bearing-down efforts of the mother continue, and the further descent of the occiput being resisted by the perineum and coccyx, the os frontis is depressed under the arch, and the chin follows the retiring breast of the child, that is, flexion continues to increase; so that the top of the os frontis, the anterior fontanel, bi-parietal suture, posterior fontanel and occiput are rapidly delivered from under the arch of the pubis—the os vaginæ being proportionably dilated.

The delivery of the head, therefore, at the vulva occurs in these posterior positions precisely in the same manner as in the anterior positions, with favorable diameters of the head presenting to the planes in the canal of the vagina and its external orifice; excepting that the occiput, being posterior, acts upon the perineum instead of the symphysis pubis, and therefore the flexion of the head is backward instead of being forward, as in anterior positions.

Although this be true as regards the natural mode

of delivery, where the occiput rotates posteriorly, yet in very many instances great difficulties will occur, as we shall enumerate under the head of Complicated Labors: but it may, however, be observed here, that the chief cause arises from resistance of the os coccygis and perineum to the process of flexion so essential to the easy delivery of the head; for by this rigidity, greater, of course, in primiparous labors, the neck of the child is pushed so far forward that it is difficult for the forehead or even for the face to get readily under the arch of the pubis—the forehead or even the face is found behind the pubis, when delivery will be very difficult, as will be hereafter explained.

LEFT SACRO-POSTERIOR POSITION.—In the fifth position, which is the reverse of the second, the sacrum of the child is to the left sacro-iliac symphysis, and the posterior part of the thighs toward the right acetabulum—of course, the left hip is toward the left acetabulum, and the right hip toward the right sacro-iliac symphysis. The same diameters of the pelvis, and eventually those of the thorax and head, correspond to the same oblique diameters of the superior strait, as in the second positions of the breech, excepting that the left side of the child is anterior or pubic and the right side of the child is posterior or sacral.

The mechanism of labor in these fifth positions is precisely the same, *mutatis mutandis*, as in the fourth positions: the only difference being that the rotation occurring on different inclined planes, is in an opposite direction. Thus, the left hip and the left shoulder, playing upon the left anterior inclined planes, become pubic, and the lateral flexure of the body is therefore upon the left side of the child, and not upon its right, as in the fourth position. So, also, when the head, in a state of great flexion, has passed the os uteri and is descending through the pelvis to the inferior strait, rotation occurs in an opposite direction to what takes place in the fourth position. If the occiput, for example, strike upon the anterior inclined plane on the left side, it will rotate with more or less readiness from the left toward the right, so as to get behind the body of the pubis, as in original sacro-anterior positions of the breech; that is, so far as the head is concerned, there will be a spontaneous conversion of this fifth position into the first, when delivery may be readily accomplished. If, however, the occiput strike upon the posterior inclined plane, then the rotation will occur from the left to the right posteriorly, the occiput will pass into the hollow of the sacrum, and the top of the forehead under the arch of the pubis. The subsequent delivery through the inferior strait and canal of the



Fig 68.

4th position of Chin
in Cavity of Pelvis

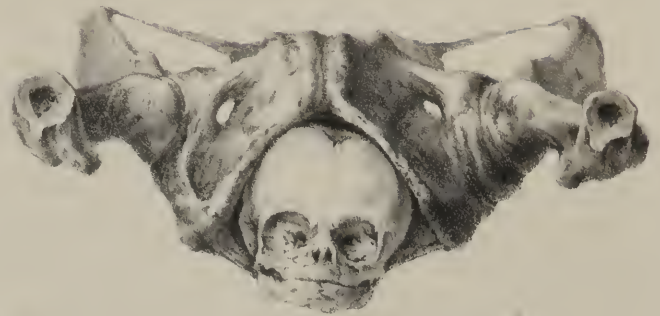


Fig 69.

at Inferior Strait



Fig 70.

Body carried back

vagina will be completed as in the fourth position, but liable, of course, to similar complications.

SACRO-SACRAL POSITION.—This is the reverse of the third, and is not unfrequently met with, especially at the commencement of labor. Although the back of the child is toward the spine of the mother, the limbs of the child are well accommodated toward the anterior part of the pelvis, and the position may remain, sometimes at least, persistent. In this case, therefore, the sacrum of the child being toward the promontory of the sacrum of the mother, and the posterior part of the thighs toward the pubis, the short diameter of the child's pelvis corresponds to that of the mother's, while its transverse or long diameter corresponds to the transverse or longest diameter of the superior strait. There is no difficulty here, therefore, for the pelvis of the child to descend through the superior strait and os uteri to the bottom or coccygeal region of the pelvis, when the sacrum of the child will be posterior, and the thighs will be perceived toward the vulva, the hips being transverse. Although delivery may seem to be near, yet nevertheless rotation of the hips must previously ensue; either the right hip will rotate toward the pubis, as in fourth positions, or the left hip, as in fifth positions. The question whether the right or the left hip will rotate forward depends upon accidental circumstances, as in cases of the third position.

In whichever way the rotation of the hips occurs, there may be so great a twist in the loins as to give some obliquity to the shoulders, which therefore are usually turned from the direct transverse position and become somewhat oblique; so that when their delivery occurs, they rotate in the same direction as the hips,—the right or the left shoulder coming to the pubis, following the right or left hip in its rotation.

The deliverance of the head at the superior strait and the os uteri is precisely analogous to what has been detailed in the third position; thus, in consequence of the rotation of the hips and shoulders, the head very seldom maintains its direct position, but some obliquity is given to it, either to the right or the left, according to the direction in which the shoulders rotated. The disposition to this obliquity of the head is exceedingly augmented by the convexity of the occiput being applied to the convex surfaces of the lumbar vertebrae; so that very universally it is turned to one side or the other, and is thus converted into a fourth or fifth position, and will, of course, be delivered in the same manner.

When describing the mechanism of labor in the fourth or fifth position, it was remarked that, in some

instances, the occiput rotated anteriorly so as to get behind the pubis, as in an original first or second position. The same thing occasionally occurs, even in the sixth position; the process of rotation, having commenced so as to bring the head oblique to the superior strait, as in the fourth or fifth position, has been continued in the same direction, so that the head has been delivered with the occiput to the pubis, instead of to the sacrum, thus describing a spiral curve to the extent of a semicircle. Velpeau mentions an interesting case of this kind where, after the pelvis was delivered transversely at the inferior strait, with the thighs anterior, and the sacrum posterior: rotation commencing with the shoulders continued until the right shoulder came to the pubis, and was delivered, after which the head continued the rotation in the same direction until the occiput was behind the pubis, and the face on the perineum; in which condition the safe delivery of the child was accomplished.

Nevertheless, cases may be met with, where the sixth position, as regards the head, will be persistent, and yet delivery may be accomplished by the unassisted efforts of the mother. In such cases, the occiput being retained, to a great degree, by the lumbar vertebrae of the mother and by the resistance of the neck of the child, the os frontis and face by the pressure from above will be forced downward behind the pubis, and the chin will be approximated more and more toward the breast of the child and the centre of the pelvis. In this state of great flexion, we shall now find the anterior fontanel toward the pubis, and the nape of the neck toward the promontory of the sacrum, while the parietal protuberances are upon either side of the pelvis; in other words, great flexion of the head has occurred, and its short diameters present favorably at the superior strait. Here, although the short or conjugate diameter of the superior strait is concerned, yet, as the head presents its cervico-bregmatic diameter, it can pass without much difficulty. In these cases of the sixth position, however, there is much more resistance to this process of flexion than in the third; inasmuch as the breast of the child, being partially within the vagina, must resist the tendency of the chin toward the centre of the pelvis, especially in primiparous labors or wherever there is much rigidity of the perineum. After the head has passed through the superior strait, all peculiar difficulty vanishes; the occiput descends into the hollow of the sacrum, the anterior fontanel under the symphysis pubis, and delivery ensues, as in other sacro-posterior positions.

From this examination of the mechanism of labor in breech presentations, it is clear that the sacro-anterior positions are by far the most favorable, as well as

the most frequent. Even a large proportion of the sacro-posterior positions are spontaneously converted, so far as regards the important delivery of the head, into sacro-anterior positions; by which the delays and difficulties incident to the posterior positions are avoided. It may be added, also, that when such changes do not spontaneously occur, the scientific accoucheur can almost universally effect this conversion; so that, in practice, delivery with the occiput toward the posterior part of the pelvis is very rarely observed, and perhaps it should never occur, if the accoucheur be present in due time. Still, however, nature is generally adequate to the accomplishment of this natural process in cases of sacro-posterior positions, with safety to the mother and the child, although more pain and delay may exist.

Let it be remembered, also, that, although the sixth position is less favorable than the third, owing to the resistance made by the breast of the child to flexion, yet it is far more rare, and, when existing, is more readily convertible into the oblique positions.

DANGERS OF BREECH PRESENTATIONS.

Although nature is adequate to the unassisted delivery of the child in presentations of the breech, and, although these and other pelvic presentations should be arranged under the head of simple or natural delivery; yet they are not so favorable to the mother or child as presentations of the occipital extremity of the head. The reasons, although perhaps sufficiently apparent from studying the mechanism of labor, should be stated more distinctly.

As regards the *mother*, labor is generally more tedious, giving rise, therefore, to more dangers of a sympathetic kind to the mind and body. This tediousness arises:—

First. From the softness of most of the tissues of the breech, which, owing to their yielding character, do not facilitate the dilatation of the os uteri, as readily as the firmer bony tissues of the head.

Second. From the comparatively small size of the breech, in consequence of which the bag of waters is less voluminous, and the os uteri, although dilated sufficiently for the passage of the breech, is still not large enough for the easy transit of the shoulders, and especially of the head; hence, delays may occur after the delivery of the breech, owing to the retention of the shoulders or the head.

Third. Still further delay may ensue from displacement of the arms, which, instead of remaining fixed at the sides of the chest, may be retained by the os uteri or by the superior strait, so that one or both arms will

be found on the sides of the head, resisting its further progress.

Fourth. In like manner, even when the arms are delivered, displacement of the head may occur: the forehead or chin being retained by the margins of the superior strait or os uteri, the occiput prematurely descends; in other words, flexion is lessened, or even positive extension may follow; the child, therefore, no longer presents the chin, but the base of the cranium, or even the base of the whole head, so that, instead of short, we have the long diameters of the head or cranium involved, as will be detailed in speaking of complicated labors.

Fifth. Another important cause of delay is the fact, that as soon as the head passes the os uteri, the contractions of the uterus have no further influence in propelling the head, which is now completely out of the uterus, and in the vagina. The further delivery must be accomplished simply by the accessory or voluntary powers of the mother; and if she, therefore, be fatigued or exhausted, the powers may be very inefficient, or even suspended.

As regards the *child*, the dangers are far greater than in vertex presentations; for all the circumstances just mentioned, which render the labor tedious to the mother, render it, at the same time, more dangerous to the child; the longer the delivery, *ceteris paribus*, the greater the danger to the infant, as it is exposed to pressure, more or less, during the whole of the second stage of labor. These dangers are exceedingly aggravated,

First. By the fact, that owing to the attachment of the umbilical cord to the abdomen of the child, pressure must be made upon its blood-vessels, to a greater or less degree, as soon as the hips pass the os uteri. This pressure is always dangerous, and, if great, is rapidly fatal to the child; therefore, if there be any delay in the delivery of the shoulders or head after the passage of the pelvis through the os uteri, the life of the child is in jeopardy. This is an important reason why still-born children are more common in pelvic than in cephalic deliveries.

Second. The second danger arises from the separation of the placenta from the internal surface of the uterus, while the shoulders or head of the child are still within the pelvis, but out of the uterus. It is well known that the detachment of the placenta is generally effected by the last contractions which expel the child, the uterus being then reduced to a comparatively small size; hence, the placental functions immediately cease, and if the head be retained, so that respiration cannot ensue from the access of atmospheric air, the child becomes asphyxiated, and must soon perish.

Third. These dangers are aggravated by premature rupture of the membranes, or any other cause by which the body of the child is for a long time exposed to great pressure, so that the functions of the viscera of the chest and abdomen are disturbed, owing to the great compressibility of these cavities. This observation applies chiefly to the functions of the heart and blood-vessels; these become partially or completely suspended by great and continual pressure on the body of the child, and, of course, will be followed by asphyxia, or actual death. The older writers thought that almost the sole reason why children died in pelvic deliveries was from the diminution or suspension of circulation in the body, while great congestion was thereby produced in the head. This idea is not tenable, as all parts are subjected to great compression, and the cerebral circulation must suffer with that of the body.

The dangers, therefore, of pelvic deliveries are far more serious to the child than to the mother: for to the latter they are not great, arising chiefly from delay and suffering; while to the former the danger is imminent from the liability to the direct or indirect suspension of the placental functions.

Nevertheless, notwithstanding all these dangers are too frequently aggravated by hasty and unscientific assistance from indiscreet or uneducated accoucheurs, delivery is usually accomplished, not only without much delay or suffering, but often with great rapidity, and with perfect safety to mother and child.

IRREGULAR PRESENTATIONS OF THE BREECH.

The second variety of coccygeal or pelvic presentations include those in which the *feet* or *knees* present at the commencement of labor prior to the descent of the pelvis; sometimes one, and, in many instances, both feet or knees may thus be detected under the nates of the child. These may well be termed irregular presentations of the pelvis. Although at first sight they seem to be peculiar, they in reality involve no essential difference from ordinary breech presentations; for the limbs of the child are so small and movable, that they really afford no mechanical obstacle to delivery. The first important resistance, therefore, in such cases, must be at the pelvis, as it presents at the superior strait and os uteri, when the mechanism of labor, both as regards the delivery of the hips, shoulders, and head, must be precisely the same as in breech cases. The whole subject, therefore, might be at once dismissed, but as there are some minor differences, which might involve the welfare of the child, and, as in many cases of artificial delivery, the accoucheurs must bring down the feet, and as authors have dwelt so much on footling

cases, some few observations may be appropriate to these irregularities of pelvic presentations.

PRESENTATIONS OF THE FEET.—On examination per vaginam, it may be observed, even before the membranes are ruptured, that one or two feet are at the centre of the os uteri; the limbs of the child being still flexed more or less toward its abdomen. Speculations as to the *cause* of footling cases are of no practical importance; they probably depend chiefly on spontaneous motions of the infant, and perhaps are more frequent in cases of right or left lateral obliquity of the uterus, when the nates will be directed more or less to the left or right side of the pelvis, bringing the feet, therefore, nearer to the centre.

The *diagnosis* of such cases is generally easily determined, especially after the membranes are ruptured; the presentation often remains high up for some time, the inferior part of the uterus is more conical, the os uteri dilates slowly and imperfectly, and the bag of waters is, therefore, smaller and more of a cylindrical character. As soon as the membranes are ruptured, the feet can generally be recognized from their peculiar anatomical characters by the experienced practitioner; care, however, should be taken, not to mistake a foot for a hand. The form of the ankle, the comparative length and narrowness of the foot, and shortness of the toes, serve as sufficient distinctions between the foot and the hand; and, although it be possible at first to confound the heel with an elbow or knee, yet the connections in either case are so different, that the diagnosis cannot remain obscure.

In all these footling cases, the heels are usually regarded as representing the posterior parts of the child; hence, in speaking of the different positions of the feet, the heels may be considered as being substituted for the sacrum, and the toes for the posterior parts of the thighs, as compared with breech presentations.

The *number of positions* in footling cases must be precisely similar to those of the pelvis, which they represent; hence, we speak of the calcaneo-anterior positions and calcaneo-posterior positions, with their usual subdivisions. Hence, the *first position* is of the heels toward the left acetabulum, and the toes toward the right sacro-iliac symphysis; it has therefore been termed the left calcaneo-anterior position. In the *second position*, the heels are toward the right acetabulum and the toes toward the left sacro-iliac symphysis; it is termed the right calcaneo-anterior position. In the *third position*, the heels are toward the pubis and the toes toward the promontory of the sacrum, and it is called the calcaneo-pubic position. These correspond to the three sacro-anterior positions of the breech, for

in each case the sacrum of the child is directly above the heels; the three posterior positions of the feet are directly the reverse of the anterior. In the *fourth*, or right calcaneo-posterior position, the heels are toward the right sacro-iliac symphysis, being the reverse of the first position. In the *fifth*, or left calcaneo-posterior position, the heels are toward the left sacro-iliac symphysis, being, therefore, the reverse of the second; and in the *sixth*, or calcaneo-sacral position, the heels are toward the promontory of the sacrum, being, therefore, the reverse of the third.

The *frequency* of this presentation is by no means comparable to that of the breech; indeed, it is very rarely to be met with in practice, occurring to Madame Lachapelle as one in seventy and a half cases, or 1.41 per cent.; or, according to Boer, one in ninety-six and two-fifths, or 1.04 per cent.

These presentations are not only less frequent but also less *favorable* than breech presentations. The mere mechanic might imagine that when the child comes footling, delivery would be easier, inasmuch as the smaller portions, as the legs, thighs, and pelvis descend first, and afterward the larger portions—the body, shoulders, and head. It has been supposed that as the child presents a conical or wedge-like form, its delivery through the orifices of the uterus, vagina, etc., would be thus greatly facilitated. But this mechanical suggestion is of no avail, for, as we have already shown, the dilatation of the os uteri is active, accomplished by the contractile powers of the uterus, and not passive, to be forced open mechanically by the presenting parts of the child. Moreover, the comparative small size of the limbs and pelvis, allowing their premature transmission through the os uteri, greatly endangers the life of the child; for the orifice of the uterus being but partially dilated after the passage of the hips, will not allow the rapid passage of the shoulders and head. Hence, there will be greater delay in the labor, and also greater pressure upon the body of the child, and especially upon the umbilical cord, not unfrequently causing asphyxia, or death of the fœtus. On the contrary, in breech cases, owing to its increased size, the os uteri is generally sufficiently dilated to allow the rapid delivery of the shoulders and head; so that the dangers just mentioned are more rare than in footling cases.

As regards the *mechanism* of labor, no real delay or difficulty occurs from the presence of the foot, leg, or thigh beneath the breech; for the membranes being ruptured, the feet and legs descend readily into the cavity of the pelvis, and are unfolded so as even to appear externally, while the pelvis of the child is still high up at the os uteri. In other instances, the knees may be retained for a short time at the margins of the

strait or os uteri, delaying the descent of the pelvis; but this is of no importance, and sometimes even advantageous by facilitating more complete dilatation of the os; the child being comparatively safe, as the umbilical cord is not yet subjected to pressure. Such delays also are transitory; for the limbs soon descend into the pelvis, before or with the nates, and do not interfere with the regular process of delivery, the mechanism of which, as soon as the nates descend, is precisely similar to that described in breech presentations.

PRESENTATIONS OF THE KNEES.—In these cases, the legs are strongly flexed upon the posterior part of the thigh, so that while the knees may be recognized at the os uteri or in the cavity of the pelvis, the feet are still within the cavity of the uterus, opposed to the nates of the child. Sometimes one and occasionally two knees thus descend before the pelvis.

The *causes* of knee presentations must be owing to some accidental position of the lower extremities in consequence of the spontaneous motion of the child or obliquities of the uterus at the time when the membranes were ruptured; the liquor amnii passing off, the contractions of the uterus, especially of the circular fibres, fix the limbs in this unusual position.

These presentations are, however, very *rare*—much more so than even presentations of the feet. Madame Boivin met with but four cases in twenty thousand five hundred and seventeen deliveries, or one in five thousand one hundred and twenty-nine; while Madame Lachapelle reports nine cases occurring in twenty-two thousand two hundred and forty-three births, or one in two thousand four hundred and seventy-one. Indeed, many experienced practitioners have never met even with one case of knee presentation.

They are also less *favorable* than breech presentations, for the conical or wedge-like shape given to the lower part of the child allows the too early delivery of the nates before the os uteri is sufficiently dilated, thus endangering the life of the child. Of course, the same number of positions should be studied as in breech presentations, simply bearing in mind that the anterior part of the legs, the spines of the tibiæ, represent the posterior part of the body, and the anterior portions of the thighs represent the anterior part of the body.

The *first position*, therefore, of a knee presentation is with the anterior part of the legs toward the left acetabulum, and the anterior part of the thighs toward the right sacro-iliac symphysis; it may be called the left anterior tibial position. In the *second position* the anterior part of the legs is toward the right acetabulum and the anterior part of the thighs is toward the left

sacro-iliac symphysis; it may therefore be termed the right anterior tibial position. In the *third position*, the anterior part of the legs is toward the pubis and the anterior part of the thighs toward the promontory of the sacrum, and it may be designated as the tibial-pubic position.

The three posterior positions are directly the reverse of these three anterior positions, according as the spines of the tibiæ present toward the right or left sacro-iliac symphysis, or at the promontory of the sacrum.

The *mechanism* of labor is very similar to that of footling cases, but perhaps a little more *favorable*, as the knees descending first, there may be less danger of the limbs becoming oblique; for in these knee presentations, the flexure of the legs is maintained very generally by the pressure of the os uteri and the sides of the pelvis, until the limbs are delivered externally, and then, of course, the flexion disappears. In the descent of the knees through the pelvis, should there be much resistance, the limbs rotate on the inclined planes, as the hips or shoulders; hence, one knee becomes pubic, and the other sacral; the pubic knee being delivered first at the vulva, and then the sacral knee; the subsequent delivery ensues precisely as in breech presentations.

THIRD STAGE OF LABOR.

We have already mentioned the *modus operandi* of the contractions of the uterus, and the bearing-down efforts of the mother in effecting the delivery of the placenta.

There are three periods of the process included in this stage, being first, detachment from the internal surface of the uterus; second, expulsion into the vagina, and third, protrusion externally.

Comparatively little is said by authors of the *mechanism* involved in the descent and expulsion of the after-birth; nevertheless, it is of practical importance to remember that the expulsive forces operate upon the placenta in the direction of the axis of the uterus coincident with that of the superior strait of the pelvis, that the placenta, therefore, passes out of the uterus perpendicularly to the plane of the os uteri, still parallel to the coccygeal region or bottom of the pelvis. Being thus deposited in the pelvis, the bearing-down efforts force it along the posterior surface of the vagina, whose curve it follows to the external orifice, through which it passes perpendicularly to be delivered externally. It describes, in its passage, the curved line of the pelvis and vagina in a manner precisely similar to that described by the head of the child; first descending,

therefore, in the direction of the axis of the superior strait, then in that of the inferior strait, and, finally, in that of the os vaginæ.

It should be remarked, however, that although in many cases these distinct periods may be recognized, yet, in some instances of delivery, one, two, or even the whole number may be practically regarded as absent.

For example, a few cases are upon record where the whole ovum has been discharged simultaneously, the membranes being unruptured. In other instances, the placenta and membranes follow instantaneously the birth of the child; the final expulsive effort of the second stage of labor throwing off the secundines with the body of the child. In some few instances, the third stage is absent, because the placenta is delivered prior to the fœtus, as in cases of placenta prævia. It frequently happens, also, that the placenta is found in the vagina after the birth of the infant, so that, strictly, there is but one period for the third stage. Perhaps still more frequently the placenta is found either at or within the os uteri, detached, but not expelled, from the uterus, the first period being thus absent; while in a few cases, the placenta is still adherent, so that the complete process, embracing the three periods, is necessary for its expulsion.

First Period.—All authors are agreed as to the mode in which the placenta is detached from the internal surface of the uterus; it is "squeezed off." The uterine surface of the placenta, which measures some six or eight inches in diameter, is very delicately attached to the internal surface of the uterus, by the remains of the membrana decidua and the very minute utero-placental arteries and veins; it is soft, and, although capable of some condensation, has no power of contraction: while the uterus is comparatively hard, contracts powerfully, and becomes very rigid. Hence, the uterus, as its contents are evacuated, rapidly diminishes in size, so that its placental surface decreases in proportion. Its plane, therefore, which a few minutes previously corresponded to that of the placenta, has, by the time the child is expelled, been reduced to a circle of probably two or three inches in diameter, necessitating, very generally, the rupture of all the adhesions between it and the soft, undiminished placenta.

Second Period.—The expulsion from the uterus is effected by its contractions, somewhat assisted by the bearing-down efforts. We believe, although it has not been noticed by authors, that at this time the cavity of the uterus assumes its original triangular form; the anterior coming in contact with the posterior surface, and thus facilitating a more complete obliteration of

the cavity than could have resulted if the globular or ovoid shape, which existed during pregnancy, were still preserved.

Third Period.—The expulsion from the vagina is accomplished, we believe, simply by the bearing-down efforts of the abdominal muscles and diaphragm. We see no evidence whatever that the contractions of the vagina, as has been supposed by many good authorities, such as Cazeaux, Ramsbotham, Jr., and others, contribute, in any degree whatever, to its expulsion. The contractile power of this tube, even in the unimpregnated state, is trifling, while after delivery, when it has been enormously distended by the head and body of the infant, no such power is manifested. It is relaxed and thrown into folds, and can exert no influence in retaining or expelling the placenta. It is still more evident that the contractions of the muscular floor of the pelvis, especially of the sphincter vaginae, sphincter ani and levatores ani muscles must, so far as they are operative, contribute to the retention of the placental mass. When, however, the woman bears down and these sphincters relax, the placenta meets with little opposition, and readily escapes.

Should any coagula of blood collect in the uterus or in the vagina, they are expelled precisely in the same manner as the placenta.

This completes the third stage of labor. If perfectly regular, the whole body of the uterus will be found low in the hypogastric region, the fundus a little below the umbilicus; and it will be firm, even hard, and of a wedge-like form. Upon examination per vaginam, the os uteri will be found quite elevated, toward the superior strait, generally quite rigid, but still open, so that

a finger could easily be introduced; the vagina is collapsed more or less into folds; the bladder and the rectum are usually quite empty; and the orifice of the vagina is relaxed, very distensible, and often, especially in a first labor, presents evidences of the rupture of the frænum perinei, and occasionally a small portion of its mucous membrane. There is very universally, also, more or less of a sanguineous discharge from the uterus, and occasionally from some of the small ruptured vessels of the perineum.

This third stage of labor is comparatively short, and is sometimes, as above mentioned, lost as it were in the second stage; but it usually requires from ten to twenty minutes for its completion—occasionally half an hour; if not completed within this period, there is generally some unusual cause, and the placenta is said technically to be “retained.”

Dr. Clark says the average time for the delivery of the placenta is twenty-five minutes; it is not unfrequently postponed, however, even in natural labors, where no assistance is afforded, for an hour and a half, or even longer. But, as Cazeaux well remarks, the delay is very universally at the third period, when the placenta is in the vagina; a little bearing-down effort therefore, would have completed the process in the usual time.

During this stage the child is, of course, free from danger; the mother, however, is liable to many accidents, from the various causes of retained placenta, from hemorrhage, inertia of the uterus, its inversion, etc., so that many lives have been lost during this stage, when the previous portion of labor had been perfectly natural and the child born alive and healthy.

CHAPTER X.

EUTOCIA.—TREATMENT OF LABOR.

CARRYING out the idea that labor is a natural process, strictly speaking, no treatment whatever is demanded. Like other natural functions, it is accomplished by the laws of the animal economy without difficulty or danger to the mother or her offspring. Experience proves that this observation is very universally true in all its extent; hence, throughout the world, thousands of children are daily born without the least supervision by an instructed practitioner, in many cases in secrecy and retirement, and often delivery is safely effected, even in opposition to superstitious practices and ignorant interference. The savage woman retires, it may be, to the forest, and secluded even from her female companions, brings forth her child; very soon she is sufficiently restored from the exertion to attend to her own necessities and those of her infant, and speedily returns to her usual laborious occupations. In civilized society, among the laborious classes, similar examples are constantly presented; and even among the delicate and refined whose physical powers have never been properly developed, the process of parturition is often accomplished rapidly, and with little comparative suffering, and perhaps long before the presence of an accoucheur can be procured.

Nevertheless, it is certainly true, that the difficulties and dangers of the parturient process are exceedingly augmented as the indulgencies and luxuries of life are multiplied. The diminution of physical power under such circumstances, the nervous excitability, as well as the mental and moral developments of the educated lady, all predispose her to various complications; while, at the same time, the natural processes are more imperfectly and less efficiently executed.

The suffering, incident to every case of labor, necessarily excites apprehension on the part of the patient and her friends. Sympathizing with her condition, attendants are anxious to afford every palliation, each offering advice which is deemed of the utmost importance; this is not restricted in all cases simply to the general circumstances of the patient, but often extended to the process of delivery. Ignorance, espe-

cially combined with fear, is always officious, and no one can imagine, much less recount the wretched consequences of empirical attempts to relieve pain, and hasten delivery. "Meddlesome midwifery," says Blundell, "is bad." This declaration has been repeated by subsequent accoucheurs, too often, it may be, as regards scientific obstetricians, but certainly not too often in respect to ignorant and uninstructed midwives, whether without or within the pale of the profession.

The fundamental rule, therefore, of the obstetrician is, that the treatment should not be positive, but, in a great measure, negative, in all cases of normal or natural labor. Negative practice, in all branches of the profession, is of immense value, and in no department is this truth more important than in midwifery. He is wise, who, understanding the natural processes of the economy, the nature and tendencies of morbid excitements, the sustaining and recuperative powers of nature, will patiently watch their developments, and often, by the simplest agencies, *facilitate* their favorable termination. He thus becomes a guardian to his confiding patient. He not only gives a proper tendency to physiological or pathological changes, but accomplishes much more in warding off the unscientific and injurious suggestions of anxious attendants.

These observations, the truth of which must be palpable, justify the declaration, that every labor should be under the supervision of a scientific accoucheur, in order that there may be no interference, direct or indirect, with the natural process of delivery. It is the business, therefore, of the practitioner carefully to watch the whole process of labor, to ascertain whether it is perfectly regular, and to detect any, even the least deviation from the natural process, that timely assistance may be rendered. He should sustain the mind and spirits of the suffering mother, and teach her what sensations she should encourage, and what she should resist, and in what manner she can most effectually promote her safe delivery.

In every case, therefore, of labor, much good can be accomplished by the physician.

PREPARATORY TREATMENT.

This is often of great importance; hence, during the latter periods of pregnancy, great attention should be paid in carrying out the principles laid down for the management of pregnant women. All sources of irritation, mental and physical, should be carefully obviated, and every measure adopted to maintain the regular secretions and excretions of the system, and to favor that relaxing process, especially of the genital organs, which ought to precede delivery.

The practitioner should never forget that, in all ordinary cases, especially in primiparous women, that *relaxation of the tissues* best facilitates labor. The popular idea, too much countenanced at the present day, that strength is wanted, should be repudiated. Experience teaches that parturition is easy when resistance is diminished.

Proper attention, therefore, should be paid to the mind and feelings of the patient, while her physical condition often requires much attention; hence, all *general excitement* or *plethora* of the blood-vessels must be diminished, sometimes by the direct evacuation with the lancet, but more frequently by refrigerants, laxatives, diaphoretics, diuretics, etc., and negatively by proper dietetic restrictions. It is a good rule, in most instances, to avoid animal food six or eight weeks prior to delivery, or, if it be demanded, to allow it in small quantities, and seldom more frequently than once in the twenty-four hours. Not only should costiveness be avoided, but all tendencies to acidities, flatulency, and other evidences of indigestion. Advantage has been gained by giving small doses of *oleum olivæ* or *oleum ricini* every night, where there is any tendency to constipation. A full dose of castor oil, on the occurrence of the premonitory symptoms, often affords immediate relief, and prevents much subsequent mischief. A large simple enema may sometimes be advantageously substituted. Care should be taken that the bladder is completely emptied, especially as females often report that they suffer from frequent urination, even when the viscus is much distended.

These general directions may be often facilitated by cool or tepid bathing: very cold baths might produce too great a shock on the nervous and muscular systems, or might not be followed by a suitable reaction; while hot baths would generally prove too stimulating to the circulatory system. In either case labor might be prematurely excited, or other more serious mischief be induced. Tepid or cool bathing, however, while it favors the secretions of the system, usually diminishes excitements, and refreshes the patient. Local baths are often advantageous, such as sitting

in warm water, or over watery vapor. Occasionally the relaxation of the pudendum, etc., may be facilitated by warm mucilaginous injections into the rectum and vagina, or by warm fomentations or poultices externally.

Much judgment is required in carrying out these and similar suggestions, especially when premonitory symptoms of labor have appeared. Very rarely will nutritious diet, tonics, or stimulants be suitable, although patients often complain of languor, lassitude, weakness, and even exhaustion. These are generally morbid nervous sensations, and are not indicative of true debility; still, however, in delicate and exhausted patients, some stimulus may occasionally be requisite for their immediate refreshment: but much food should not be given, as digestion is feeble, and the consequences of indigestion aggravate the symptoms of labor.

The question as to *exercise* must be decided according to the various habits and circumstances of the patient. Its great advantages, during pregnancy, have already been detailed, in maintaining the strength of the patient, her powers of digestion, and the various secretions and excretions of the system: it should, therefore, be persevered in, as a general rule, until the very commencement of labor. In very many instances, however, particularly in multiparous women, exercise is impracticable, especially during the last periods of gestation; the relaxation of the abdominal parietes, allowing the uterus to fall far forward, and the pressure against nervous trunks in the pelvic region, giving rise to neuralgia, numbness, stiffness, cramps, and sensations of weariness, often prohibit not merely exercise, but even the sitting posture. There are often irregular neuralgic and spasmodic irritations of the uterus, forbidding muscular effort, and endangering premature labor. All these symptoms may be aggravated by sympathetic disturbances from the brain, spinal marrow, stomach, intestines, etc. Hence, although the general rule of exercise is very important, and should often be pressed upon the patient, yet the exceptions are very numerous, and much must be left to the discretion of the practitioner. It may be well to remark, that much stiffness of the extremities and even pain often arise from the want of exercise. In such instances, the first efforts to walk seem to be impossible; yet speedily these sensations disappear, and the patient returns home agreeably surprised at the relief gained by exercise.

Preparatory to labor, the accoucheur should often give directions on the several subjects relating to the future comfort and welfare of the patient.

A large and well-ventilated room, as retired and

quiet as practicable, should be prepared for the accouchement, furnished with curtains, blinds, or shutters, so as to exclude light, heat, etc., as may be requisite. Close stoves or furnaces should be avoided, and the bed so located as not to be exposed to currents of air; or curtains and screens should be so arranged as to divert such currents from the patient. Seldom, however, should any curtains be attached to the bedstead, unless it be at the head or corner, to prevent any draft of air which could not otherwise be avoided. The floor should be covered with carpet, so as to prevent noise, as well as to increase the comfort of the apartment.

The proper *bed* for a lying-in woman has been a subject of discussion, and different practices exist in various places, regulated by prejudice or custom. On the continent of Europe, it is generally recommended that a woman be delivered on a narrow bedstead or lounge, and, on the completion of the process, to be transferred to another bed. The objections to this plan appear to be serious: for, after delivery, the patient is in a profuse perspiration, which may be too suddenly checked by removal; she is always greatly fatigued, feels weak, and there is often much exhaustion, from the severity of her sufferings, from flooding, etc., frequently amounting to faintness or even syncope. The effort necessary to remove her is great, increasing the exhaustion, endangering the recurrence of hemorrhage, and favoring the liability to subsequent neuralgic or inflammatory irritations, without any apparent compensation resulting in any way to her comfort. The best plan, therefore, is, that the woman should be delivered on the same bedstead on which she is afterward to remain.

A good mattress is preferable to a soft bed, both during and after parturition: it should be large, so as to cover completely even the edges of the bedstead, and be so arranged that the patient may be delivered toward the lower extremity and be afterward removed to the upper portion, previously prepared for her reception. It is unnecessary to give details upon this subject; suffice it to say, that the mattress should be completely protected by oil-cloth or gum-elastic sheeting, blankets, or other soft materials, so as to prevent the discharges of water and blood, which occur during and after labor, from penetrating to its surface. It would be best, also, to have some article impervious to moisture placed across the upper part of the bed, upon which the patient is to lie after delivery, covered by a clean sheet, so arranged as not to be soiled during delivery.

The *dress* of the patient demands attention: her usual bed-dress should be completely elevated above the waist; while the lower part of the body or limbs should be loosely covered by a large skirt, open behind,

without shoulder straps, or by means of a folded sheet or blanket secured loosely by tapes around the waist, so that these garments, which will be necessarily soiled during labor, can be readily removed after its accomplishment. Warm stockings or socks, as well as slippers, should cover the feet, and no bands or ligatures should be applied to the extremities or body of the patient.

Proper preparations should of course be made for the *child*, especially a strong ligature to secure the umbilical cord, scissors for its division, plenty of warm water for ablution, and some alcoholic and other stimuli should always be in readiness for the resuscitation of an asphyxiated infant, as well to meet the wants of its often exhausted parent. In many instances, the practitioner must give particular directions on all these subjects. He should advise that a large number of napkins or towels be at hand to absorb the discharges; and that an abundance of lard, oil, or mucilages should be in reserve to facilitate his operations, and to diminish any rigidity of the external tissues of the mother.

TREATMENT DURING THE FIRST STAGE OF LABOR.

The practitioner is not often called until the labor has actually commenced, and, therefore, it will be his immediate duty to inquire and to give directions as to the various points just mentioned. Many of the directions already given for the management of the puerperium, are equally applicable during its first stage. It will often be requisite, therefore, to promote relaxation by warm baths, diaphoretics, bleeding, etc., etc., if there be any indications of plethora or inordinate excitement; occasionally, a laxative may be administered, but generally the bowels, if costive, should be emptied by some simple enema. The condition of the bladder should receive special attention, care being taken that it be completely evacuated. If the patient cannot accomplish this object, the catheter should always be employed. The use of this instrument during labor is often difficult, owing to the compression of the urethra between the pubis and the head of the child. Hence, the practitioner should be very careful, not only to direct the instrument upward behind the symphysis pubis, but also to avoid force, and, if much difficulty exist, to push back the uterus with his finger, so as to diminish the compression of the urethra. A flattened or gum-elastic catheter has been thought preferable in these cases. It should not be forgotten, that the urethra is also much elongated, requiring the instrument to be passed an unusual distance before the water will be evacuated.

While the os uteri is dilating, the patient may usually be left to choose her own *position*; and she may be allowed to sit up, or walk about at pleasure.

Great attention should be paid to her mind and feelings, which are generally excited and apprehensive. Much depends upon the practitioner and the other attendants; these last should be few in number, two, or, at the utmost, three, being an abundance. They should be judicious and cheerful, as well as attentive and prudent. Favorable prognostications, as far as possible, should be presented to the timid woman, and her thoughts directed, as much as practicable, from herself and infant, to other interesting subjects of a pleasant character. Any disturbance of her *nervous system* should be counteracted, it may be not merely by moral but by physical appliances. Hence, simple anti-spasmodics and narcotics may occasionally be required, such as spirits of nitre, Hoffmann's anodyne, camphor, assaetida, or, it may be, even some of the preparations of opium, which, however, should, if possible, be avoided; these may be assisted by warm drinks, and warm applications to the extremities, by frictions, etc., when the surface is pallid, and feet, hands, etc., are cold. Even if severe tremors or rigors exist, no other measures will be required.

The *nausea* or *vomiting* may sometimes depend on indigestion, but more frequently on the nervous system; there being much disturbance of the stomach, without any discharges, except gases. In either case, the free administration of simple warm drinks—there is nothing superior to pure water—contributes greatly to the relief of the stomach, and, at the same time, favors perspiration and other relaxing processes. Occasionally some anti-emetic articles may be advisable.

Vomiting, however, during labor, is seldom injurious, and often beneficial, by removing quantities of undigested food, and acid, acrid or bilious matters from the stomach, and also by depressing general nervous or vascular excitements; occasionally, therefore, if the stomach be foul, a little ipecacuanha or other mild emetic article may be added to the warm drinks.

The patient seldom demands food during labor, and, if it be taken, it is seldom well digested. Hence, it must not often be proffered, even in tedious labors; or, if taken, should be of the mildest character.

The drinks should be mild, warm, or cold, according to the desires of the patient, and may, if demanded, be freely administered. Very universally, all stimulating drinks, whether vegetable infusions or alcoholic preparations, should be avoided.

Feelings of oppression about the heart and lungs are generally hysterical, and are to be treated accordingly; although, in some instances, they are aggravated by

congestions which may require bleeding or other evacuations. Uneasy sensations about the head, such as giddiness, cephalalgia, etc., may also be purely nervous; but here there is much more danger of cerebral congestion of a serious character, demanding similar attentions.

During this period of labor, the contractions of the uterus are often very harassing to the patient, who feels persuaded that "they are doing her no good." This notion should be always obviated, the practitioner explaining the benefits resulting from these early contractions, and that they are essentially requisite for opening the orifice of the womb, that the child may escape.

During this first stage of labor no "bearing-down" efforts should ever be made; it would be a good rule if the woman should always avoid making such efforts until directed by the practitioner. There is sometimes such a sensation of pressure or weight, that the woman unconsciously yields to a premature exertion of the abdominal muscles, and, unfortunately, her ignorant attendants frequently encourage her to make such exertions. They are, however, not only useless, as the child cannot escape, but positively injurious, both to mother and child.

To the mother, such efforts stimulate the uterus to inordinate action, thus increasing the sufferings of the woman, and the os uteri becoming more unyielding and rigid; the patient is unnecessarily fatigued, and is frequently discouraged, because the labor does not advance. The membranes are not unfrequently ruptured, and the liquor amnii discharged; hence the contractions become more powerful and protracted, with a disposition to strain, and the os uteri, if before partially dilated, again contracts under the presenting part of the child, rendering a new dilatation necessary. The labor is thus made more tedious, painful, harassing, and exhausting to the patient; in some instances, there is great mental and nervous excitement, amounting even to delirium, while, sometimes febrile symptoms may supervene.

To the child, the dangers are, perhaps, still greater. Prior to the rupture of the membranes, the fetus and its appendages are, comparatively, free from pressure, and the child, therefore, is safe: but as soon as the waters are evacuated, the contractions of the uterus, now increased, bear directly upon the child; it is greatly compressed by every returning pain, and, as it cannot escape through an undilated os, such compression will, more or less, impede its cerebral and vascular functions. The circulation in the body of the child, in the cord, and also in the placenta is, more or less, interrupted, and there is imminent danger of partial or com-

plete asphyxia, or even of actual death, an event not unfrequent when the pains are powerful and rapid, and the os uteri is undilated. Although the mother and child may often escape these severe accidents, yet more or less inconvenience and delay usually result from premature efforts to bear down, especially if there be a rupture of the amniotic sac.

The *diagnosis of labor* is not always, however, readily established; hence, the practitioner should always inquire carefully into the history of the phenomena, and, if any doubt remain, he must make a careful vaginal examination. Labor may be supposed to exist when it comes on without any apparent exciting cause; when the pains commence moderately, return at regular intervals, and gradually become more severe and extensive. They may thus be distinguished from "*False pains*," so called, which generally begin severely, are irregular in their return, often have very long intervals, and sometimes suddenly disappear—occasionally returning with more or less severity at intervals of twelve or twenty-four hours, even for weeks in succession. These false pains are generally accompanied with rigidity of the uterus, which is sometimes thrown into irregular forms, some portions contracting more than others. Very generally there is an evident exciting or accidental cause, such as mental disturbance, great fatigue, flatulency, tympanites, and gastric or intestinal irritation. It will be prudent not to trust to these general symptoms, but at once to examine per vaginam. Regular pains will always affect the neck and orifice of the uterus, rendering the tissues tense during their continuance, and evidently dilating the orifice; while these irregular contractions have little or no effect upon the neck or orifice of the uterus. The nature of these irregular contractions are evidently neuralgic or spasmodic, being connected with some irritability of the nervous system, or some accidental source of irritation; and, however painful and troublesome, they are seldom productive of positive mischief. They often interfere with the sleep and repose of the patient, and occasionally bring on actual labor; they should be obviated, therefore, by paying great attention to the predisposing and exciting causes, especially to those dependent upon the cerebral, spinal, or the digestive apparatus. The exciting causes being removed, the irregular contractions may be diminished by tepid bathing, anodyne frictions to the abdomen, and judicious exhibition of antispasmodic and narcotic remedies.

The diagnosis of labor may, to the inexperienced, be occasionally difficult where the woman is not willing to acknowledge even that she is pregnant. We have known, in our own practice, and in that of others,

cases, where the usual symptoms of labor were present, and yet the patient positively denied that such an event was possible. A vaginal examination will, where true labor exists, dissipate all doubt.

Women, moreover, will often insist that they are pregnant, and occasionally, that labor even has commenced, where there has been no conception. In some cases, the woman is deceived by her own sensations, or by the representations of her friends; while, in other instances, deception is practised from sinister or criminal motives. The diagnosis, when careful examination is made, is usually easy; but there are many cases of this "spurious" or "feigned" pregnancy, in which great difficulty will exist in forming a positive opinion. The uterus, for example, may be enlarged from extraneous causes, the os uteri high up, the abdomen big, not only from the size of the uterus, but from the deposition of adipose matter. The patient, also, may have nausea, and other symptoms of dyspepsia. In other examples of nervous, hysterical women, where the uterus is hypertrophied, or where the ovaries are irritated and enlarged, there are sympathetic disturbances of the stomach, mammæ, and of the nervous system, very similar to pregnancy; while the abdomen is enlarged from gaseous accumulations. The patient insists that she is conscious of foetal movements, and, in some instances, has managed, by irregular actions of the abdominal muscles, to convince her friends that such movements exist. We have known ladies, even those who have borne children, to be deceived on this point, even for five or six months.

The prudent practitioner, notwithstanding all the difficulties which may be presented, even by designing women, will seldom err in these spurious cases, if he attends carefully to the history of the case, and to the existing condition of the abdominal viscera, as ascertained by an external and internal examination. This differential diagnosis will, in some doubtful cases, be greatly assisted by adopting the ingenious suggestion of Dr. Simpson, of Edinburgh. He proposes to put the woman in a state of anæsthesia. Under these circumstances all contractions of the abdominal muscles, and all sensibility being entirely suspended, a very accurate examination can be made through the abdominal walls, even where there has been great previous distension from tympanites. Dr. Simpson asserts that the size of the abdomen, when the patient is anæsthetic, greatly subsides without any apparent escape of gas from the rectum; but that the distension of the abdomen returns when anæsthesia disappears. However difficult it may be to explain this last stated phenomena, etherization must be regarded as a valuable assistant in some dubious cases of feigned pregnancy.

The *progress* of the first stage of labor may often be ascertained with considerable accuracy by the experienced accoucheur; he can judge by the degree of the relaxation of the tissues, especially the cervix uteri, by the thickness or thinness of the edges, and by the effect produced on the os uteri by each returning pain. He should bear in mind that usually the enlargement of the os is much more rapid after it has been partially dilated than at the commencement of the process. Sometimes this dilatation is completed with great rapidity, even when the first period of this stage had been very tedious. Nevertheless, the prognosis must always be somewhat doubtful, and the prudent practitioner will be careful as to his promises to his anxious patient.

After the os uteri is partially dilated, the presenting part of the child may often be determined by the experienced accoucheur, especially in cephalic presentations. During the absence of a pain, when the membranes are relaxed, the practitioner carrying his finger within the os uteri, can recognize the head not only by its firmness and resistance, but also by one or more of the fontanelles or sutures, thus determining not merely the presentation, but also the position of the child. Occasionally he may recognize the breech by its comparative softness and elasticity, by its high position, and by feeling portions of the sacrum. In transverse presentations usually nothing can be positively felt, the body of the child being high, and the bag of waters imperfectly formed; although occasionally the hand, arm, or shoulder may be detected through the membranes.

Although such examinations per vaginam are demanded during the first stage of labor, yet they are not to be unnecessarily made; as they produce more or less irritation, disturb the sensibilities of the patient, and might, through inadvertence, cause a premature rupture of the membranes.

Neither is it desirable that the practitioner should remain long with his patient; his visits may be frequent and sufficiently prolonged to quiet her anxiety, and to excite pleasant anticipations. His continued presence, on the contrary, might induce a suspicion that "things were not right," that he was anxious about the result, or that he expected a very rapid termination of the labor. If practicable, he should always be within call, as the os uteri often suddenly relaxes, and the delivery may be accomplished with great celerity.

TREATMENT DURING THE SECOND STAGE OF LABOR.

The first stage being completed, the practitioner should immediately insist on the recumbent position,

especially in multiparous women; for, neither the mother nor the child is safe in the erect posture, as it often happens that by one strong expulsive effort the membranes are ruptured, the child and even the placenta delivered, perhaps before proper assistance can be rendered. The child may be injured by the fall, the umbilical cord ruptured, the placenta prematurely detached; or the child may be suffocated by profuse discharges of water or blood from the parent, while the mother may become faint or exhausted from the fright, from the sudden emptying of the uterus, from hemorrhage, or it may even be from the occurrence of inversion of the uterus. By recumbency these dangers may be avoided.

The proper *position* in bed is of much importance. The practice usually followed by the Continental physicians, of placing the woman upon her back in all cases of labor, has much to recommend it, as will be hereafter seen, especially when the head approximates the floor of the pelvis, or when surgical measures are demanded. The English and American practice, however, of placing the patient on the left side, particularly during the first periods of the second stage, is generally preferable; as the patient is not then so long confined to one posture, her extremities can be better supported, and the practitioner can more readily and accurately examine the superior portion of the pelvis. This position also is more in accordance with the delicate feelings of the woman.

Reasons have already been given why the deliverance should be accomplished toward the lower portion of the bed. It is immaterial, however, whether the nates are brought nearer to the sides or the foot of the bedstead, but it is important that the patient should be placed parallel to the sides of the bed, when the nates are toward its foot. It is a common practice to give an oblique position to the woman, so that her head will be placed at the centre of the bed, and her feet toward the bedpost. The straight position of the trunk thus induced, has a tendency to prevent the ascent of the fundus of the uterus toward the umbilicus, and of course the necessary approximation of its axis to that of the superior strait: hence, the child is directed toward the sides or anterior part of the pelvis, rather than toward its central positions; so that power is lost, and the labor delayed.

The patient, therefore, should be placed upon her left side, with the nates toward the foot of the bedstead, the legs flexed upon the thighs, and the thighs upon the body; and whenever she makes a bearing-down effort, the face should be approximated to the chest, and the chest to the knees, so as to increase, as far as possible, the flexure of the body, thus facili-

tating a favorable direction of the uterus, (Plate III., Fig. 23.) To maintain this position more effectually, the patient's feet should be implanted firmly against the bedpost, while her upper extremities should be directed downward and forward by grasping the arms of an assistant or a strong towel attached to the bedpost, to which the feet are applied. Under these circumstances, it is evident that the more powerfully she drags on this bandage, the greater forward inclination will be given to the chest, increasing flexion: while, provided the knees be drawn up, the location of the nates will not be changed; the pelvis being fixed by the strong action of the muscles of the lower extremities pressing the feet firmly against the post. It is not unfrequently desirable that an additional support should be given to the pelvis by the hands or feet of an attendant pressed firmly against the sacral region, which pressure is, very generally, agreeable to the patient, and is often earnestly solicited.

In this way the flexion of the body, which is so important, is greatly facilitated, and the more violent the muscular efforts of the patient, the more completely is it perfected. It is, therefore, altogether wrong, as has been too frequently practised, to fix the bandage, which the patient is to grasp, toward the head of the bedstead, or even to its sides, as, thus, flexion is prevented instead of being augmented.

It will be found comfortable to the patient, to place a small pillow or a roll of some soft material between her knees, so as to keep them separate; it will, at the same time, facilitate the manipulations of the practitioner, especially toward the termination of the delivery. This, we think, is preferable to the advice often given by the English practitioners, of committing the separation of the knees to the nurse, as she seldom executes the duty correctly, often becomes fatigued, and her services are frequently wanted for other and more important duties.

If the patient be placed in the supine position, the same general principle of flexion should be regarded: the lower limbs should be flexed, the feet implanted low down toward the edges of the bedstead, and the shoulders and head elevated as far as possible on an inclined plane, formed by pillows, etc., while her upper extremities are to be grasped by assistants, one upon either side.

A very ingenious apparatus, made of pads and leather straps, so arranged as to follow out the above indications of flexing the extremities and the pelvis, and augmenting flexion during the throes of labor, has been introduced into practice; to what extent, the author is unacquainted,—probably to a very limited

degree, as such restraints will not usually harmonize with the notions of women.

It is now important to ascertain, the *presentation* and *position* of the fœtus. Great care should be taken to enter the orifice of the uterus during the absence of a pain, so as not to rupture prematurely the bag of waters. A favorable diagnosis being established, and the practitioner being satisfied that the os uteri is fully dilated, he should encourage the patient to make *bearing-down efforts*, for which there is now a strong disposition. These efforts should always be in unison with the contractions of the uterus, to which they are subsidiary; the continuance of the effort, after the uterus is relaxed, accomplishes very little good, serves to exhaust the patient, and unnecessarily disturbs the functions of respiration, circulation, etc. Many women, however, from timidity, fear of increasing their suffering, ignorance, or even from feelings of modesty, dreading an evacuation from the rectum, resist the disposition to strain, and often become very nervous and excitable. The importance of the process should be explained to them, especially in hastening the progress of labor, thus shortening the period of suffering; and they should be assured that there is no real danger from even violent but well-regulated efforts, and that the practitioner will afford them all needed assistance. As a pain approaches, they should be exhorted to take a full inspiration, then to hold their breath, to bend the head and chest forward, and to exert all their muscular actions, even those of the extremities, in the manner already directed. As soon as the pain is over, they should relax their muscles, and be exhorted to take deep, full inspirations, to the relief of uneasy sensations, congestions of the lungs and heart, and even of the brain, which were induced by the temporary suspension of the respiratory process. Such inspirations can be rapidly repeated until another pain supervenes. They should be cautioned, also, to close their eyelids firmly, so as not merely to support the balls of the eyes, but to moderate inordinate congestion of their vessels, the disposition to effusion in their tissues, or even hemorrhage, which may sometimes occur, with perhaps permanent injury to vision.

During these efforts, the practitioner, we think, should be very constantly at the bedside of the patient, to ascertain accurately the progress of the labor, and be ready to obviate any irregularity which may occur, or to facilitate any of the natural changes which should successively ensue. Thus, if the os uteri be fully dilated, and the bag of waters large, the pains feeble, and the membranes of the ovum unyielding, they should be ruptured. The reasons are very obvious and satisfactory: it is the usual and natural period for the mem-

branes to give way. The retention of the waters is no longer useful; on the contrary, by maintaining the distension of the uterus, they prevent its efficient action, and thus delay the progress of labor, and increase the anxieties of the mother. By rupturing the membranes, and facilitating the discharge of the liquor amnii, the tonic and expulsive contractions of the uterus are greatly augmented, and the labor may hasten rapidly to a conclusion. Care, however, should be taken that such rupture is not made prematurely; for if the os uteri be not fully dilated, it may contract forcibly, on the discharge of the waters, underneath the presenting part, thus delaying labor, often for a long time, as there must be a subsequent irritation of the os, under unfavorable circumstances. The *rupture of the membranes* can generally be easily accomplished, by firm pressure, for example, with the index finger against the bag of waters, during an expulsive effort; the membranes rupturing on the projecting point of the finger. In other instances, more pressure is required at each return of the uterine contractions. Often the practitioner may scratch the membranes with his nail, or even, if they be very strong, employ the points of scissors, probe, etc., to insure a puncture. Simple as is this operation, great care must be taken to prevent mischief. The diagnosis may have unfortunately been wrong: the bladder distended with urine and occupying the cavity of the pelvis, the very attenuated walls of the uterus, or, still more frequently, the scalp of the child disturbed and elongated by serous or bloody effusions, have been mistaken for the membranes of the ovum, and have been much injured, by the nails or instruments of the practitioner. A mistake is more likely to occur when there is a very small quantity of the liquor amnii intervening between the membranes and head of the child. It demands, therefore, much care, especially from the inexperienced practitioner, who will act more prudently, in all doubtful cases, by waiting for the spontaneous rupture of the ovum.

The *time* at which the puncture should be made is also important. It should be at the commencement of a bearing-down effort, for then the waters being evacuated, the subsequent contractions of the uterus will force the presenting part completely within the circle of the os uteri, thus preserving its dilatation; if ruptured toward the end of a pain, the os uteri may contract under the presenting part, causing delay.

Occasionally, when there is a large quantity of liquor amnii, and the uterine contractions are feeble, it will be advantageous to push up lightly the presenting part, so as to allow the waters to escape on the return of the contractions, and thus completely empty the uterus of

its fluid contents. For the comfort of the patient, and even of the practitioner, an abundance of napkins or other soft materials should be at hand to absorb the fluid as much as possible.

If the diagnosis has not been previously established, it ought now to be accurately made, so that if any assistance be requisite, it should be afforded before the uterus contracts powerfully on the child, and, of course, when the head is still high up, and in the cavity of the uterus. The necessity for this practice is not only obvious, but urgent, inasmuch, if there be any mal-presentation, it should be immediately known while the child is movable. Too many practitioners are contented with what may be termed a superficial diagnosis, being satisfied, for example, with recognizing the head without determining what part of the head "presents" to the centre of the pelvis, or in what "position."

In the natural labors, where the vertex presents, this portion of the head must be recognized by the presence of the posterior fontanel, near the orifice of the uterus, or, at least, of the angle formed by the posterior margins of the parietal bones. The position of this angle, and the direction in which the sutures run, will generally be sufficient also to determine the "position" of the presentation. Further assistance may be usually gained by tracing the bi-parietal suture to the anterior fontanel, or the pubic branch of the lambdoidal suture to the mastoid process of the temporal bone. Occasionally, if the os uteri be relaxed sufficiently, the edge of the pubic ear can also be perceived. This, however, can seldom be accomplished, and the practitioner will not be justified to trust his diagnosis "to feeling the ear." It should be established, if possible, long before the ear can be felt.

Important as an accurate diagnosis may be, it is always a difficult process to the inexperienced, and occasionally to the long-tried practitioner, arising, sometimes, from the elevated position of the head; from an unusual degree of ossification; from the absence of the posterior fontanel; and especially from seroid or bloody infiltrations under the scalp, which occur in tedious labors, particularly when the os uteri is rigid. Difficulty also arises from the deficiency of proper ossification, as in premature children; where the sutures are broad, often resembling fontanels. So, also, when all the tissues of the head, including even the bones, are very soft, flexible, and easily moulded into different shapes, as observed where the infant has been for some time dead in utero prior to the occurrence of labor; and occasionally it may be, in the case of a hydrocephalic child, where the water has been evacuated from the cranium, and the bones of the head have collapsed.

It would be almost impossible, also, to make an accurate diagnosis, if, unfortunately, the foetus should be deformed, as in case of acephalic or anencephalic children, etc. Care and attention, however, in ordinary labors, can seldom fail to afford a correct knowledge of the presentation and position, always most desirable for the comfort of the practitioner, and the welfare of the mother and her child.

The treatment, therefore, of the second stage will be modified by the presentation, whether of the vertex or coccygeal extremity of the ellipse, and also by the various positions of these presentations.

LEFT OCCIPITO-ANTERIOR POSITION OF THE VERTEX.

—The waters being discharged, bearing-down efforts should be encouraged at regular intervals, and the practitioner should carefully notice the process of descent. If any nausea or sickness be still present, simple warm drinks will alone be requisite, which will act as carminatives, and also as diaphoretics. The patient is often very thirsty, and there can be no objection, if desired, to administer cold, even iced drinks, in small quantities at a time, as the violent pain and muscular efforts will keep up a disposition to perspiration, and prevent any chilliness from the influence of cold. The process of fanning, or free ventilation to the room, are very grateful, and, for the same reasons, are quite safe.

The practitioner should always maintain a cheerful and pleasant demeanor, encouraging his patient as much as possible, regulating the conversation of the attendants, and, at the same time, exercising a due degree of authority, so as to ensure a compliance with his directions, important for the comfort and welfare of his agonized, and often semi-delirious patient. Not unfrequently, amid the anxieties of the moment, such authority must be extended over the sympathizing relatives and other attendants; for, whatever may be the emergencies of the case, the practitioner should never lose his self-command, and always be kind and gentle, even when he must be firm and decided.

If the os uteri afford undue resistance, no mechanical measures should be adopted, such as pressure or traction by the fingers, as recommended by some physicians, but recourse should be had, as in cases of "rigidity," to means for promoting relaxation, or for diminishing irritation. Should there be any delay at the first period of the second stage of labor, from a deficiency of flexion, this process may be *facilitated*, in a manner hereafter directed, in cases of dystocia. During the second period rotation should readily occur, or it also may be facilitated, as hereafter directed. During the third period, and especially during the fourth,

when the head is out of the uterus, and this organ very much diminished in size, the expulsive efforts become very strong and frequent. Hence, in multiparous patients, little delay is usually experienced; but, in primiparous women, there is some delay in all cases, especially where the secretions are not abundant, and the nervous system irritable, as is often observed among the delicate and refined.

It has already been maintained that, even in normal labors, there is often danger of lacerations at the lower extremity of the vagina and perineum, during the process of extension and delivery at the os vaginæ. Hence, in every labor, however regular, the liability to this accident must not be forgotten. The presence of the practitioner at this time is imperative, as two important indications are to be fulfilled—the first, to facilitate extension, and the second, to prevent laceration of the perineum.

When the base of the occiput is completely under the sub-pubic ligament, and the top of the head is pressing upon the perineum and coccyx, extension is caused by the resistance of these tissues at the outlet of the pelvis. It is manifest that, at this time, any pressure of the fingers or the hand of the practitioner against the posterior perineum, now corresponding to the region of the anterior fontanel, will, by resisting the natural tendency of the head in the direction of the axis of the superior strait, determine it forward toward the orifice of the vagina, and that if this pressure be continued as the head advances, it may be directed even still more effectually against the forehead after it has passed the extremity of the coccyx. When the occiput has advanced somewhat in front of the pubis, this process of extension can also be facilitated by pressure against the vertex, so as to determine the occiput nearer to the symphysis pubis. Occasionally it will be proper to pass one or two fingers into the rectum, so as more completely to support the posterior wall of the vagina, and to act more directly upon the os frontis than can be done through the whole thickness of the perineum. There can be no doubt that judicious pressure, in the manner detailed, when not commenced too early, may very powerfully assist extension, as well as contribute greatly to relieve the distressing sensation of pressure and fulness at the outlet of the body. Hence, such assistance should often be rendered in cases of feeble action of the uterus, and becomes a valuable, although not always an adequate substitute for manual or instrumental delivery.

The second indication—to prevent rupture of the perineum—is most effectually accomplished by the same pressure which facilitates extension; for as rupture arises from a direct pressure of the head against the

perineum, distending it more and more, it is manifest that any pressure upon the opposite side will, by moderating the distension, contribute to maintain the integrity of the tissues; while at the same time it may give a proper direction to the head. To "support the perineum," therefore, is the important business of the accoucheur at this crisis of delivery. Different modes have been recommended for this purpose. The French, who usually deliver their patients in the supine position, place the fingers of the hand transversely across the perineum; the thumb intervening between the external labium and the thigh. When the patient lies upon her side, it has been more frequently recommended to extend the left hand longitudinally over the perineum: the fingers being directed backward toward the coccyx. By many a napkin is placed under the hand. This, however, is objectionable, as through it the practitioner cannot recognize the progress of the head, and to what point therefore the pressure should be chiefly directed. The mode of making pressure, however, must be left to the discretion and experience of the practitioner; let him bear in mind that the greatest distension begins posteriorly, and in this first position to the left of the median line. As the occiput advances, this point of greatest distension approximates more and more to the anterior perineum and to the median line. Hence, the opposing pressure upon the perineum should be gradually altered from behind forward as the head advances. The author, therefore, has found it advantageous to resist the distension of the perineum, and to facilitate extension of the head by pressing the extremities of the fingers of the left hand in a somewhat conical form, at first toward the posterior perineum, then gradually passing forward; while the fingers of the right hand over the vertex and occiput may give a proper direction to the occipital extremity of the head, or may sometimes be extended to the posterior commissure of the vulva, where rupture is most likely to occur. At the close of the delivery, the fingers of the left hand must often be directed almost exclusively to the anterior perineum.

In some cases of delivery, where the resistance of the perineum and os vaginæ are very great, and where the bearing-down efforts are strong, the danger of rupture of the perineum is so imminent that the practitioner will be justified in *retarding*, to some degree, rather than facilitating the process of extension and expulsion, so as to allow more time for a safe dilatation of the os vaginæ. This may be accomplished mainly by urging the patient to suspend as far as practicable the action of the abdominal muscles and diaphragm, which at this time, perhaps, constitute the most effi-

cient agents of expulsion. The head being thus subjected only to the uterine contractions, advances more slowly, and the practitioner may sometimes still further retard the process by placing the fingers of his right hand, arranged in a conical form, over the occipital protuberance, and thus gently pressing the head back into the vagina in a direction corresponding to its axis; while the support given to the perineum by the left hand, may be directed not so much against the os frontis but more against the vertex, thus retarding rather than facilitating extension of the head. Doubtless severe ruptures of the perineum have, by these measures, been frequently prevented, yet much gentleness and discretion are here demanded.

As the head passes out of the orifice of the vagina, the fingers of the practitioner should be carefully applied over the posterior commissure of the vulva, so as to give it a firm support, while this margin rapidly recedes over the top of the head, forehead, and chin of the child, as rupture may even then ensue; at the same time, the fingers of the right hand upon the occiput may prevent any sudden exit of the head after the delivery of the parietal protuberances.

As soon as the chin of the child is liberated from the vagina, *restitution* of the head ensues, provided there be any twist in the neck. The practitioner should allow the head to assume the oblique position consequent upon restitution, without, however, attempting in any manner to facilitate the process; for it is possible that there may have been no twist in the neck of the child, and therefore no restitution should take place, and the attempt to cause it may prove injurious.

On the delivery of the head, the practitioner may safely and positively assure his patient that her greatest suffering is over, and that the rest of the labor will be comparatively short and easy, thus affording great mental and moral relief to her and her anxious friends.

As soon as the head is delivered, the practitioner should pass his finger to the neck of the child, to satisfy himself, in the first place, that the perineum has not fixed itself upon the mouth or chin of the infant, but is completely retracted; and, in the next place, to ascertain whether the *umbilical cord is entwined around the neck*. This accident is seldom of any importance; but, nevertheless, if further delivery be delayed, the circulation may be so impeded as to endanger asphyxia. It would be best, therefore, to loosen the loops of the cord by means of slight traction of the finger, so as to allow the placental circulation to continue. This, we think, is all that is proper.

There is no proof that the placenta would be separated by the cord thus shortened; for it should be

borne in mind, as has been observed, that such loops around the neck of the child can only occur when the cord is unusually long; and especially that the child is not forcibly drawn away from the uterus, but is expelled by the contractions and descent of the uterus from above, so that the cord is not stretched by the descent of the child so long as it is still in the vagina. The only possible danger, therefore, of separation of the placenta is after the child is born, when, of course, the detachment will be of no importance, and very generally occurs. Neither is there any danger, as has been supposed, of inversion of the uterus; inasmuch as such an accident cannot occur during the powerful forcing pains which characterize the termination of labor. The plan often recommended, and which we formerly followed, of enlarging the loops so as to enable the practitioner to pass them over the head of the child, or, as some have recommended, to slip them downward over the shoulders, promises very little if any additional safety to the child, and may be productive of positive mischief, by stretching the cord, by endangering its laceration, and by the pressure thus produced actually retarding, if not arresting, for the time being, the umbilical circulation. Indeed, the time necessary for this manœuvre is also a serious objection, as the child's body ought to be immediately delivered. Neither is this practice to be recommended, because the tightness of the loops around its neck might impede the respiration of the child after birth; for, in the first place, these loops can be loosened without carrying them over the head and shoulders of the infant, and, secondly, it is the duty of the practitioner to remove the cord from the neck immediately after delivery.

If these views be correct, the practice sometimes recommended, under these circumstances, of dividing the cord, before delivery of the body, cannot be sanctioned; it would imperil the life of the infant, and would occupy important time at a very critical moment—just when placental respiration is terminating, and before pulmonic respiration is established.

After the passage of the head, there is usually, not always, a suspension of the bearing-down effort. This interval should be occupied not only in the manner just mentioned, but by the practitioner ascertaining the position of the shoulders in the vagina, which are then slightly oblique. On the recurrence of pain, he should encourage a strong bearing-down effort on the part of the mother, taking care as the shoulders rotate toward the pubis and sacrum, that the *external rotation* of the head should not be impeded; allowing the head spontaneously to change its oblique position—produced by restitution—so that its occiput may

point directly to the left thigh and the face to the right.

There is still danger of rupture of the perineum from distension caused by the body of the child; the fingers of the left hand, therefore, should support the anterior perineum and fourchette as they glide over the left shoulder and side of the infant; while, at the same time, by pressure the lateral flexure of the right side of the child toward the symphysis pubis should be facilitated.

Should there be any delay, the practitioner should facilitate rotation of the shoulders in the manner hereafter explained, and occasionally make a slight traction effort; carrying the body of the child upward toward the pubis, not merely to increase its lateral flexure, but to bring the shoulders into more exact parallelism with the plane of the os vaginæ. The body and the hips of the child pass out readily.

The advice above given of suspending the bearing-down efforts after the delivery of the head, and waiting for another pain for the delivery of the body, is sanctioned by the generality of practitioners. Dr. Dewees and also M. Cazeaux particularly urge it, as ensuring the regular and perfect contraction of the uterus, so that there will be less danger of subsequent relaxation of this organ, and, of course, of hemorrhage, inversion of the uterus, and also less liability to after-pains. In many instances, however, the forcing pains are so strong that there is no choice left for the practitioner; the head and body of the child, and sometimes even the placenta, being rapidly expelled by one strong bearing-down pain.

The child, being born, should be placed at some little distance from the mother, avoiding, however, any traction on the cord; it should be laid upon its right or left side, so as to promote the discharge of mucus, etc., from the mouth, and at the same time prevent the discharges from the mother accumulating about its face, and interfering with respiration.

At this moment of immense relief to the anxieties and sufferings of the parent—the delightful consciousness of being a mother—the practitioner should quiet every inordinate excitement of the patient or of her friends, and in every way prevent the accession of nervous symptoms.

Attention should at once be given to the condition of the uterus; the hand should be immediately placed on the abdomen to discover whether the uterus be hard, and even rigid, occupying simply the hypogastric region; whether, although hard, its fundus extends higher up toward the umbilicus; and especially whether it be found soft and relaxed. In the first instance it may be inferred that the placenta has passed out of the uterus; in the second, that it is still in utero, and that there

is no particular danger of hemorrhage; while in the third, that there is inertia of the uterus, and imminent danger of severe hemorrhage.

An internal examination should also be made to determine whether the placenta is still in utero, at the orifice of this organ, or in the vagina; and whether hemorrhage be present, or any coagula have collected in the vagina or in the uterus. It should be determined at the same time whether the os uteri be sufficiently contracted, and if any laceration has taken place at the os uteri, in the vagina, or at the perineum.

The diagnosis being favorable, the child should be wiped dry with warm napkins, and then the umbilical cord should be secured. For this purpose one strong ligature should be applied about two inches from the umbilicus; it having been previously ascertained that the cord is in a natural condition, and that no congenital umbilical hernia, etc., exist. To prevent subsequent hemorrhage from the slipping of the ligature, it should be drawn very tightly, and the cord divided at least half an inch beyond its location, so that a little button-like extremity is given to the stump of the cord. This is all that is absolutely requisite; but most practitioners advise, with good reason, that two ligatures should be applied, and the cord divided between them. This is an act of prudence to prevent hemorrhage from the placental portion of the cord, in case of an inosultation of its blood-vessels with those of a twin placenta; and moreover, in all cases, it contributes to cleanliness by preventing effusions of blood from the placenta.

The division of the cord may be made with any cutting instrument. The best of these, however, is a pair of blunt-pointed scissors: and it may be well to caution the young practitioner that there is real danger, unless care be exercised, of cutting the fingers, toes, or, as has actually happened, the penis of the infant. A good plan, therefore, is to pass the fingers of the left hand between the cord and the body, and thus prevent the extremities of the child, during their agitation, interfering with this otherwise very simple operation.

Discussion has existed as to the time when such ligatures should be applied. Many practitioners wait until the umbilical circulation has entirely ceased, while others have pursued the opposite plan of ligating the cord as soon as the child is born. To the first idea there can be no serious objection, as it is a mere question of longer or shorter time; indeed, this rule is always to be acted upon whenever the child is feeble, or respiration imperfect, and, of course, therefore, in all

cases of asphyxia, provided any pulsation remains in the cord. Great mischief often results from the premature tying of the cord; for if the placental function be interrupted before respiration and the pulmonic circulation, which ought to occur at birth, be fully established, congestions of the lungs, heart, and brain are immediately induced, resulting in partial or complete asphyxia, or even death. Even when the child survives, for some time the phenomena of the "morbus cæruleus" will exist, and may be succeeded by serous or bloody effusions into the tissues or cavities of the body, and usually by death.

The best rule, therefore, is never to secure the cord until respiration be fully established, until also the bluish tinge of the lips, mouth, face, etc., have disappeared, and an active capillary circulation be generally completed; then no bad consequences will result from the application of the ligature, even if the pulse should still exist in the cord.

The child, being now liberated from the mother, should be carefully handed to the nurse; the practitioner bearing in mind that the surface of the body is usually covered with a sebaceous matter, must be cautious in holding the infant. It is generally recommended to take hold of the lower extremities with the right hand, while the left hand is placed under the scapulæ, with the thumb and index finger extended so as to support the head of the infant. The author's practice has been to embrace the thorax of the infant, with his right hand extended so that the palm is over the sternum, the thumb under the right axilla, and the fingers under the left, and cause the head of the child to fall toward the sternum. This is a natural position for the infant, and it will be found that the hold of the practitioner is very secure, while it leaves his left hand free for any required assistance.

The nurse should present her "receiver," that is, a piece of flannel, or a small blanket with a warm napkin toward its centre, on which the child is to be placed. It should now be completely enveloped by the receiver, except the face, so as to excite and maintain its capillary circulation, and then laid in a secure spot until proper attentions have been paid to the mother. The nurse should be cautioned to place it on one side or the other; so as to facilitate the discharge of watery or mucous fluids from the mouth, and not allow them to gravitate toward the glottis, as might occur when the position is supine, and thus impede respiration. The nurse, and also the practitioner, should occasionally examine the child to discover if the respiration continue perfect, and whether there be any hemorrhage from the cord.

TREATMENT DURING THE THIRD STAGE OF LABOR.

The practitioner should now re-examine the condition of the uterus, the location of the placenta, etc., and ascertain the general state of his patient. Generally, he should direct, as soon as the child is born, that some woollen garment or blanket should be thrown over the body and limbs, so as to prevent any bad consequences from a sudden suppression of the perspiration. If she be cold, nervous, or exhausted, some moderate stimulant or narcotic may be exhibited: a cup of tea, not very hot, or, what is better, some farinaceous food with a little spice, wine, or brandy, may prove refreshing. If there be chilly sensations, or decided rigors present, small quantities of ether, ammonia, camphor, paregoric, or even laudanum, may be given.

No hemorrhage being present, the practitioner may quietly wait for the delivery of the placenta. It has been the author's custom, during this interval, to change the position of the patient from that of the side to the back; it affords her much relief from the constrained posture, which had been so long occupied; it prevents any tendency of the uterus to fall into the lumbar region; facilitates its descent, and, of course, that of the placenta, toward the cavity of the pelvis, and gives the practitioner a far better opportunity for any subsequent manipulations, which may be demanded for the delivery of the placenta.

When there is a return of the uterine contractions, the patient should be advised to make a bearing-down effort; and this should be repeated as strongly as possible, at every recurrence of the pain, until the delivery is effected. Let it be remembered, however, that neither patient nor practitioner should wait for a pain in all cases; inasmuch as the placenta has sometimes been extruded from the cavity of the uterus by the last contractions which expelled the child. If, therefore, this body be found in the vagina, a bearing-down effort should be made for its expulsion, as, of course, nothing can be accomplished by the uterus. Inexperienced physicians have waited during hours, and even days, for the recurrence of uterine pain, when a little exertion of the mother, or slight assistance from the practitioner, would have immediately finished the process.

The contractions of the uterus, when necessary for the detachment or expulsion of the placenta from its cavity, may be generally expected within thirty minutes; but sometimes, they occur immediately after the second stage of labor is completed. Should there be any unusual delay, the practitioner may *facilitate* the contraction of the uterus by placing his hand through the medium of the relaxed walls of the abdomen over the fundus of the uterus, and, by making a

firm pressure, direct the whole organ toward the superior aperture of the pelvis. This locomotion of the uterus, conjoined with this pressure, excites, very generally, the contraction of its fibres, as evinced by its increased hardness and rigidity, and by the descent of the placenta. Gentle frictions over the uterus may be likewise instituted, and the patient exhorted to make the usual bearing-down effort.

This is a far safer practice than to make traction efforts upon the cord, as is usually done by the ignorant and officious attendant. Such traction may prematurely detach the placenta, and give rise to severe and dangerous hemorrhage; or, if the uterus be relaxed, the fundus may be drawn down with the placenta, and a partial or complete inversion of the uterus be produced, with all its immediate or future dangerous results; while, in other cases, the umbilical cord may be torn off, rendering subsequent delivery of the placenta still more difficult. These and other complications will be hereafter noticed. In natural labor, it will be sufficient merely to facilitate delivery, by increasing the contractions of the uterus and the voluntary efforts of the mother.

When, however, the placenta has completely entered the orifice of the vagina, the patient should suspend at once all bearing-down efforts; as it often happens that the delicate membranes of the ovum may be partially within the uterus, and be there so retained that, if there be sudden delivery of the body of the placenta, the membranes may be lacerated and retained. This accident is, perhaps, of no serious importance; nevertheless, the membranes will serve to keep up a predisposition to hemorrhage or to subsequent uterine contractions, and, if retained for days, may putrefy, and thus become a source of mischief. Their unexpected discharge also, whenever it may occur, generally terrifies the patient or her nurse, who regards it as a very unnatural phenomenon, portentous of evil, and, of course, imagines that the practitioner has been very derelict in his duties. To prevent this accident, therefore, the placenta should be carefully rotated on its own axis, at the orifice of the vagina, after the expulsive effort has ceased. The effect of this rotation is to twist the membranes, now in the vagina and uterus, into the condition of a cord; it, of course, is gradually shortened by the spiral turn thus given to it, retracting the membranes slowly, but very efficiently, from the mouth of the uterus. Occasionally, it may be proper to pass the finger along this cord of the membranes, and, by gentle pressure, liberate it from the os uteri.

The placenta being removed, a renewed examination should be made to determine whether the uterus be fully and regularly contracted, and whether there be

coagula accumulated in the vagina or orifice of the uterus. Renewed frictions and pressure should be made upon the uterus, if it be still relaxed; and all coagula should be removed from the vagina and orifice of the uterus, either by bearing-down efforts or by the fingers of the practitioner. The presence of coagula is always a source of irritation, and not unfrequently excite hemorrhage. It is prudent, in most cases, even to repeat these examinations, as there is often a tendency to renewed relaxation and hemorrhage even for some time after delivery.

Some practitioners have recommended a bandage—the “*Binder*”—to be applied to the abdomen immediately after the birth of the child, and before the placenta has been removed. This we think very premature, and indeed useless; any good effect which it might exert in favoring the contractions of the uterus will be much better accomplished by the hand of the accoucheur.

After the placenta and coagula have been removed, the application of a “*binder*” becomes very important. A broad towel, if sufficiently long, answers very well; a bandage, however, with gores, so as to be wider over the hips than around the thorax, is perhaps preferable. It will be advantageous to place one or two folded towels over the umbilical region above the uterus, to act as a compress; over this the bandage should be drawn rather tightly from above downward, and secured by pins so as to make an equable pressure over the whole abdomen, and direct the intestines downward around the uterus. The advantages of a binder thus applied are—

First. It supports the abdominal viscera, the diaphragm, and even the organs of the chest. Hence, it takes away the feeling of emptiness and exhaustion tending to syncope, which sometimes follows a sudden subsidence of the abdominal tumor. The experience of the surgeon as to the utility of the bandage in the operation of paracentesis abdominis is confirmatory of the above remark.

Second. The binder facilitates and maintains the tonic contractions of the uterus, and thus prevents a tendency to inertia, hemorrhage, etc.

Third. It is also beneficial in preventing by its uniform pressure any tendency to passive congestions of the abdominal blood-vessels, especially those of the uterus, and thus diminishes the probability of uterine hemorrhage, inflammation, etc.

Fourth. The pressure from the binder facilitates the gradual contraction of the cutaneous, areolar, and muscular parietes of the abdomen; and, if maintained moderately for a few weeks after gestation, it will do much to condense the superficial tissues, and to prevent

a pendulous abdomen, which is a source of real inconvenience to many married women, and destroys the symmetry of figure, generally so much valued by ladies.

It has been objected to the binder, that the regular pressure cannot well be maintained, that it will act more as a ligature around the loins than as an abdominal compressor. This, certainly, could arise only from bad management, as some thin pieces of whalebone would prevent this accident, or, what would be still better, small strips may be passed, like a T-bandage, between the limbs, or over the thighs of the patient, so as to prevent the binder from slipping upward.

The objection, often urged, that it will produce prolapsus, deserves no attention, as the uterus after delivery occupies the hypogastric region, and is too large to descend into the pelvis.

To secure its good effects, it will be usually necessary for the practitioner himself to apply the binder, or superintend the nurse in this simple operation.

This being accomplished, the patient may be “*put to bed*”—that is, be carefully raised from the lower to the superior portion of the bed—provided she be not too much exhausted, that there be no perspiration, and there be no chilliness or rigors present. It is best, we think, to do it at this time, while the mind of the patient is still excited. All the garments should be at once removed from the lower part of the body, and also from the limbs; while the sheets, blankets, etc., upon which she was delivered, are to be carefully rolled up and taken away. Her person must be carefully dried with warm napkins, and then covered with a warm woollen skirt or blanket; while her stockings, generally soiled, should be changed. One or more napkins should be applied to the pudendum; and then, by several attendants, the mother should be slightly elevated, still remaining in the horizontal position, and thus raised to the upper portion of the bed, previously prepared for her reception. The clean sheet may now be drawn downward over the whole bed, and the patient well covered with bed-clothes, sufficiently thick or numerous to keep her warm; occasionally, additional covering, or even bottles of hot water, etc., should be applied to the feet.

Some mild restoratives, especially food, with or without stimulants, may now be required; the patient generally expresses herself as being “*very comfortable*,” and much relieved by the change of position. Being now free from mental anxiety, and more or less fatigued, she should encourage sleep—her best refreshment. All conversation and company should be excluded, and the room be kept quiet; the infant even being removed, if practicable, to another apartment.

It is seldom, however, safe for the practitioner to leave his patient until, at least, one hour after delivery; as there may be subsequent relaxation of the uterus, a collection of coagula in the vagina, or in the womb, with or without the appearance of blood externally, and sometimes followed by distress in the pelvis, by pain, by syncope, exhaustion, or even death. Too many patients have perished from inattention to this simple rule. The practitioner, indeed, should never be satisfied unless he finds the uterus firmly contracted above the pubis; that there be no inordinate discharge per vaginam, and no collection of coagula in this canal; that the general capillary circulation be fully restored; and that the pulse be natural, not too weak on the one hand, or too full and labored on the other.

MODIFICATIONS OF THE TREATMENT OF NORMAL LABOR.

Such are the simple rules for the management of natural or normal labor, founded upon the careful observations of the natural functions of the economy during the process. Although simple, they are very important: they may be, and often are violated with impunity by the strong and laborious woman; but all such violations, with the delicate and refined, seldom occur without injury, and are often productive of the most serious consequences. The "*negative*" value of these directions, by guarding the welfare of the mother and her child from the injudicious and dangerous interference of ignorance and empiricism, is by no means their least recommendation.

Very few modifications of these rules need be detailed for the management of normal labor, in the different positions of the vertex and coccygeal presentations of the fetal ellipse.

RIGHT OCCIPITO-ANTERIOR POSITION.—In the *second* position of the vertex, the treatment is precisely the same, unless it be requisite to facilitate rotation. It should then, of course, be in an opposite direction from that of a first position.

OCCIPITO-PUBIC POSITION.—In the *third* position, immediate attention should be paid at the commencement of the second stage of labor to procure a more favorable position of the vertex, according to rules hereafter laid down in cases of dystocia from mal-positions of the vertex; or, if that be not practicable, it will be more frequently requisite to facilitate the process of flexion than in the former position. Of course, no attempt should be made to produce *rotation*, inasmuch as the occiput is already toward the pubis; but, as the

shoulders descend transversely, it will be occasionally requisite to facilitate their rotation anteriorly or posteriorly to the pubis or coccyx.

RIGHT OCCIPITO-POSTERIOR POSITION.—In the *fourth* position, which is so much more tedious and painful to the mother, and, where accidents may frequently happen to the child, great attention is demanded to make a correct and early diagnosis, and then to secure the rotation of the occiput on the anterior inclined plane of the pelvis, in the manner hereafter described. The author, judging from his own experience, believes that such rotation can always be effected; at least, he has never failed to accomplish it, and thus materially lessen the duration of the labor, the sufferings of the mother, and the dangers of the child. Let it be borne in mind that, as has already been demonstrated, there is a natural disposition to this anterior rotation, arising from the greater comparative length of the anterior inclined plane, and the projection of the spine of the ischium inwardly; so great is this tendency in most cases, that the occiput, even without assistance, will rotate forward, so that an original fourth position is converted into a second. This fact M. Nægelè has fully demonstrated. At the same time, however, two other facts will not be forgotten:—

First. That such rotation, although sometimes rapid and easy, yet, very frequently is effected slowly and with great suffering, and occasionally is not accomplished; the head remaining stationary, unless artificial assistance be given. Nægelè, it is true, denies this, and says that the anterior rotation occurs as easily in the fourth as in the second position: this, however, *à priori*, is very improbable, as, in the former case, the occiput must describe at least three-eighths of a circle against many resistances, while, in the latter, it would have to describe only one-eighth of a circle; and our experience has been directly and constantly in opposition to this declaration of M. Nægelè.

The *second* fact is, that the posterior rotation, in these fourth positions, does occasionally occur. This is universally admitted, and even by M. Nægelè himself. It is always attended with increased suffering and danger to both mother and child. Hence, the practical deduction is in all cases, to ensure the anterior rotation. If the posterior rotation have occurred, then it becomes the duty of the practitioner to facilitate, by every practicable mode, that great degree of flexion of the head so requisite for delivery in these occipito-posterior positions, and which must be continually increased, until the vertex be delivered.

The "*support to the perineum*" demands now special attention, as the distension of this tissue is neces-

sarily great in such cases, and the tendency to its rupture, or even to its perforation, is very marked. This support should, as in the occipito-anterior position, have two objects. The first is to prevent inordinate distension and rupture; and the second, to facilitate, by external pressure, the flexion of the head after the occiput has passed the os coccygis, or sacro-sciatic ligaments. By the judicious pressure of the fingers of the left hand of the practitioner against the posterior part of the perineum, and, as far as practicable, toward the base of the occiput, and by simultaneously pushing the os frontis behind the pubis with the fingers of the right hand, both these indications will be greatly facilitated. Pressure against the perineum must follow the occiput as it descends, and be most strictly attended to, as the vertex advances toward the anterior perineum and posterior commissure of the vagina, where distension will be the greatest, and, of course, where there is the greatest liability to rupture.

The occiput should be pressed more and more forward until the frænum perinei has successively glided over the vertex and occipital protuberance to the neck of the child; then the occiput should be allowed to extend backward against the perineum, while the anterior fontanel, forehead, and face rapidly pass, during this process of external extension, from under the pubis, thus effecting the complete delivery of the head.

The practitioner should now allow restitution to occur, so that the chin should point toward the left groin, and the occiput toward the right tuber of the ischium; after this the ordinary attentions to the cord around the neck, to the rotation of the shoulders, and to the external rotation of the head should be paid.

LEFT OCCIPITO-POSTERIOR POSITION.—In the *fifth* position the practice is essentially the same as in the fourth position, *cæteris paribus*. In other words, for reasons already stated, the fifth should always be converted into the first position; the forehead and face being directed backward on the right side of the pelvis, and the occiput forward on the left anterior inclined plane, so as to secure the advantages of an original left occipito-anterior position. If, however, unfortunately, the occiput is found posterior toward the sacrum, flexion should be facilitated, and the perineum supported, as already indicated; while restitution, after the delivery of the head, should be allowed to occur, so as to bring the chin to the right groin, and the occiput to the left tuber of the ischium. Subsequently, it may be necessary to facilitate the rotation of the right shoulder to the pubis, and the left to the sacrum, causing also the external rotation of the head, which will bring the face of the child to the right thigh of the mother.

OCCIPITO-SACRAL POSITION.—In the *sixth* position, attention should be paid to rules similar to those detailed for the third position; the natural disposition for this sixth position to be converted into the fourth or fifth should be insured, if possible, by measures hereafter to be detailed. If this change be accomplished, we are advised to allow the occiput, as it descends into the pelvis, to rotate into the hollow of the sacrum, for fear that if the occiput should rotate anteriorly toward the pubis, the neck would be twisted to a most dangerous extent, to the injury of the spinal marrow, and, of course, involving the life of the child. The rule, therefore, in an original sixth position, has been to allow the occiput to descend posteriorly, notwithstanding all the sufferings and dangers which usually ensue.

Although no one can boast of experience in these sixth positions—as they are so exceedingly rare—yet, from our own personal examinations in occipito-posterior positions, and from wonderful cases recorded of obstetric operations, in which the child's head has been made to describe, with impunity, half a circle in the cavity of the pelvis, we have no hesitation in declaring that an original sixth position may be converted not only into a fourth or fifth, but, after the head has descended into the pelvis, it will be safe, very gradually, of course, to facilitate rotation of the occiput, according to rules given, to the anterior part of the pelvis. If this be judiciously and slowly accomplished, we have reason to believe that it can be done with impunity to the neck and spinal marrow of the child, inasmuch as during the throes of labor the shoulders will be found gradually to rotate with the head to such an extent as to prevent any dangerous torsion of the cervix. Should, however, the occiput rotate posteriorly, the case should be treated, as already directed, in other occipito-posterior positions.

If the head remain in the sixth position, then *facilitate* flexion at the superior strait. The subsequent delivery requires attention, as in other occipito-posterior positions, excepting that no rotation of the head should be attempted, while rotation of the shoulders more frequently requires assistance.

TREATMENT OF PELVIC PRESENTATIONS.

For reasons, already detailed, these presentations have been classed under the head of Natural Labors, which implies that nature is fully adequate to the delivery in a large majority of cases. In the language of Baudelocque, such labors are “unassisted.”

Hence, the duties of the practitioner in these, as in vertex presentations, are almost exclusively *negative*.

He ought to be perfectly familiar with the natural course of labor, that he may, on the one hand, ward off any officious interference with natural efforts; and, on the other, be prepared to detect any, even slight deviations, from the normal progress of labor, and, of course, to afford promptly the requisite assistance.

The value to the mother and the child of this negative practice, great as it is in vertex presentations, is far more important in pelvic deliveries. No one, acquainted with the history of obstetrics, can be ignorant of the vast amount of mal-practice in these cases. The simple fact that these deliveries have been classed under the head of preternatural labors has encouraged and sanctioned the idea that interference and assistance were absolutely demanded; while the general ignorance, by no means yet dissipated, of the natural mechanism of labor in pelvic presentations, has greatly contributed to the unfortunate results so common in these cases. Dr. William Hunter is reported to have asserted that when he interfered in breech cases, the children were often lost; but that they generally survived, when the process was left to nature.

The general treatment of the mother is similar to that in vertex presentations; but some special attentions are demanded in cases when the pelvis presents. The most important practical remark is, that the integrity of the ovum should be preserved as long as possible, inasmuch as a child may be regarded as safe until the liquor amnii be evacuated; the child, cord, and placenta being comparatively free from pressure. Another advantage is, that so long as the ovum is preserved entire, the os uteri is in the process of dilatation; and the more complete this dilatation, the more rapid and safe will be the delivery of the infant after the membranes are ruptured: in other words, the first stage of labor should be prolonged, and the second be rendered as short as possible.

During the *first stage*, therefore, it behooves the practitioner to be watchful—not leaving his patient for any length of time—and to give specific directions, so as to prevent, if possible, any premature evacuation of the amniotic fluid. Hence, the patient should be recommended to lie down as much as possible, carefully to avoid any straining effort, even as regards defecation or micturition. Hence, also, she should avoid sneezing, coughing, vomiting, etc. Assistance should be afforded by the physician to aid her in the evacuation of the bladder or rectum, and suitable measures employed to relieve flatulency and vomiting, or to quiet any intestinal irritation. The practitioner should also avoid frequent examinations per vaginam, and, when these are requisite, he should be most careful not to injure the membranes, or irritate the cervix uteri.

The *second stage* being fully established, so that the os uteri is dilated sufficiently, not merely for the passage of the pelvis, but of the shoulders and head, the importance of a negative practice should be impressed upon the mind. Nevertheless, we should be upon the alert, and special attentions are demanded to *facilitate* the natural progress of pelvic deliveries. In the treatment, therefore, of the

LEFT SACRO-ANTERIOR POSITION.—In a *first* position of a breech presentation, even after the os uteri seems to be dilated, no attempt should be made to rupture the membranes—even if the breech have passed the os uteri and approximated the os vaginæ—as the pressure of the bag of waters facilitates the still further enlargement of the os uteri, and protects the body, cord, etc., from pressure. If, however, the membranes project at the vulva, and the breech be on the perineum, the waters may be evacuated, or unnecessary delay will result. As soon as the os uteri has dilated completely, the patient should be encouraged to make her bearing-down efforts during the existence of “pain;” but the practitioner should avoid any traction effort, and it is very rarely that any attempt should be made to *facilitate* rotation: for, owing to the small size of the breech, descent and rotation ensue with sufficient rapidity. If traction effort be made upon the pelvis, it might cause the descent of the body so speedily that the elbows and arms would probably be detained by the edges of the os uteri, and thus not descend with the thorax. For the same reason, when the pelvis is at the vulva, traction effort should be still avoided; the patient should be encouraged to make her bearing-down efforts, so as not only to maintain but to augment the flexion of the head and chest. Care should be taken to support the perineum, especially in primiparous labors, as there may be some danger of rupture, and also as such support, when properly directed toward the posterior part of the perineum, may determine the breech more readily to the vulva, thus increasing the lateral flexure on the left side toward the pubis. The breech being delivered, care should be taken that the limbs do not glide out too rapidly, so as to injure the perineum, and, also, that no impediment be given to restitution.

The umbilical cord, being now within reach, should be carefully examined, and, if the pulsations be feeble and the cord tense, a small portion should be drawn down and pressed toward the face of the child, so as to relieve it, as much as possible, from pressure. It should also be immediately ascertained whether the arms have descended with the thorax, as, otherwise, assistance ought to be immediately rendered, as will be hereafter detailed. No traction is now justifiable, as it

would have a tendency, through the medium of the spine of the child, to cause the premature descent of the occiput, and thus destroy the flexion of the head. The child's body should be sustained at the vulva, so that even its gravity may not prove, in like manner, injurious. The expulsive efforts are now generally strong, the shoulders descend and rotate without difficulty. As they approximate the perineum and os vaginae, the body of the child, which has rotated externally with the shoulders, should be carried forward toward the pubis, avoiding any traction, so as to facilitate the lateral flexure of the neck, and, at the same time, the more ready transit of the shoulders through the orifice of the vagina. These desirable effects can, at the same time, be promoted by judicious pressure upon the perineum, which would also obviate any tendency, in this tissue, to rupture.

The shoulders being thus fairly delivered, and restitution of the body having occurred, traction effort should still be avoided; but the body of the child should be carefully carried directly in front of the pubis: this position will have a great tendency to facilitate the ascent of the os occipitis behind the pubis, and the descent of the chin toward the centre of the pelvis, thus facilitating the natural disposition to presentation of the chin, so desirable in all pelvic presentations. At this period of labor, there should be a careful re-examination of the umbilical cord. If the pulsation be vigorous, the child may be regarded as safe; if feeble, and especially if suspended, great apprehensions may exist as to its life, and even artificial assistance, according to prescribed rules, may be demanded.

Generally, however, it will be sufficient to draw down a portion of the cord, and to push it toward the side of the face and the temple, as, there, the pressure on its tissues will be less great.

It will be generally found that when the shoulders are delivered, the head, if presenting favorably, has already passed through the os uteri and superior strait; and that it readily rotates, so as to bring the occiput behind the pubis, and the chin toward the perineum. If this should not be the case, proper assistance ought to be immediately rendered. The head being in the pelvis, the practitioner should never forget that the uterine contractions can have no influence over its propulsion, and that the completion of the delivery must depend on the voluntary exertions of the mother. Hence, she should be strongly encouraged to increase her bearing-down efforts, while the practitioner, carrying the body of the child in front of the symphysis pubis, (Plate XII., Fig. 66,) should place the fingers of his left hand on the perineum, in front of the coccyx, so as not only to support the perineum, but, through it,

to increase the disposition to flexion, by pressing on the top of the os frontis, which will now be found resting on the posterior wall of the vagina. This support should be gradually advanced toward the anterior perineum, as the forehead progresses toward the vulva, thus constantly increasing flexion, and diminishing the liability to rupture of the perineum.

This is the critical moment as regards the life of the child; delay now is very dangerous, not because the cord is greatly compressed, but because the functions of the placenta have, almost universally, ceased, the uterus, empty of the child, has contracted sufficiently, in ordinary cases, to detach the placenta, and, of course, to destroy its functions. The danger is much greater in primiparous patients, where the perineum is rigid; and in all cases where, from the size of the child's head or other causes, any delay is experienced. Our practice, therefore, in such cases, has been, when the face is upon the perineum, to pass one or two fingers into the rectum, which will enable us, very efficiently, to increase the flexion of the head, and, at the same time, to diminish the liability to injury of the perineum. We feel very confident that, by these simple manœuvres, of carrying the body of the child in front of the pubis, and by pressure from the rectum, a rapid delivery can be very universally facilitated, in perfect accordance with nature's laws: the chin of the child being thus brought to the centre of the orifice of the vagina, and the cervico-bregmatic circumference parallel to its plane.

Should there, however, be any great delay at this juncture, still further assistance may be rendered by *traction* upon the body of the child, made by the practitioner or his assistants directly upward, that is, with the neck parallel to the symphysis pubis. A moment's consideration will exemplify the great mechanical efficiency of traction thus established at this juncture, when the face is on the perineum, the top of the head on the rectum supported by the fingers of the practitioner. Traction thus made acts through the medium of the neck upon the whole head, and draws it against the symphysis pubis. The base of the occiput is, however, immovable; and hence, all such traction must have the effect of determining the anterior part of the head nearer the chest of the child; in other words, to augment flexion as well as assist the bearing-down efforts of the mother in propelling the head. In this way, we, in the language of the mechanician, use the head as a lever of the third kind, the fulcrum being at the base of the occiput, the power acting through the spine, while the resistance is at the forehead.

We have been thus minute in these directions, believing them in perfect accord with nature's mode of

delivery, and, therefore, as facilitating her processes at the most important juncture, when delay is very dangerous. As already intimated, the plan is very efficient, and, we believe it will render the use of forceps unnecessary except in extraordinary cases; for, however valuable this instrument, it is not always at hand, every practitioner is not familiar with its use, and the child may often perish before it can be properly employed. It will be hereafter shown how dangerous traction is to the safety of the child and the tissues of the mother, if it be made, as has been too frequently advised, in the direction of the axis of the inferior strait; indeed, in any other direction than directly upward when the woman is supine.

If, however, there be, unfortunately, any unusual delay from the failure of the above measures, manual or instrumental, life may occasionally be continued, while the head is still in the vagina, by exciting the function of respiration. This has been accomplished by the practitioner passing two fingers between the perineum and the face of the child, so as to press the perineum away from its mouth and nostrils, and thus allow the access of atmospheric air, while the natural tendency to respiration is facilitated by frictions and warmth to the body, by cold douches, etc., as advised in cases of asphyxia. Dr. Meigs informs us that he has kept a child breathing some twenty-five or thirty minutes under these circumstances. We repeat, however, that delay is most dangerous, and that no time should be unnecessarily lost, even in the attempt to excite respiration. (Vide Dystocia from Mal-presentations.)

RIGHT SACRO-ANTERIOR POSITION.—The treatment of the *second* position of the breech is virtually the same as that already detailed in the first position; the practitioner, of course, bearing in mind that the right hip is now pubic, and that rotation of the hips, shoulders, and head must occur in the opposite direction to that which takes place in the first position.

SACRO-PUBIC POSITION.—In the treatment of the *third* position of the breech, the long diameter of the hips being transverse, rotation does not occur quite so readily as in the former position, but there is usually no difficulty; the left hip, as in first positions, rotating toward the pubis, or the right hip, as in the second position. The practitioner should be careful, however, to ensure this rotation, and afterward that of the shoulders, not merely on account of the ready transit of the pelvis or thorax of the child, but especially because such rotation will greatly contribute to a favorable change in the position of the head at the superior strait. This change, as formerly observed, very generally occurs

spontaneously, so that the third position is changed into the first or second; that is, the os frontis glides from the promontory of the sacrum toward the right or left sacro-iliac symphysis. Under these circumstances, no peculiar difficulty will ensue; if, however, the head remains with the occiput toward the pubis, the practitioner should endeavor to determine it to the left or the right side, in the manner hereafter detailed.

Or, if this be impracticable, flexion should be *facilitated*, by carrying the body of the child forward, and giving it to an assistant, and pressure made by the fingers of the practitioner upon the face or occiput of the child.

RIGHT SACRO-POSTERIOR POSITION.—In the *fourth* position more attention will be demanded from the practitioner to secure an easy delivery; for, although nature is usually adequate to accomplish this process, yet in the sacro-posterior positions there is necessarily more delay and more danger to the foetus than in the sacro-anterior positions. These important facts were detailed in speaking of the mechanism of labor.

As soon, therefore, as the os uteri is fully dilated, and the fourth position of the breech has been recognized, it is requisite continually to watch the progress of labor, and, it may be, to facilitate the complete rotation of the right hip, and then of the right shoulder to the pubis, carefully supporting the perineum, as the hips and shoulders are delivered. The hope may constantly be entertained that in consequence of this rotation of the body, the head will be so far changed from its oblique position as to ensure the rotation of the occiput toward the pubis, as in original sacro-anterior positions. It is, however, imperative with the practitioner not to trust to this spontaneous revolution of the head, inasmuch, as in this fourth position, the chin and face of the child, striking upon the left anterior inclined plane of the pelvis, will be more readily determined forward toward the vulva; of course, throwing the occiput toward the sacrum. As this will be less favorable than the anterior rotation of the occiput, it should be counteracted, by one or more fingers of the practitioner, introduced into the vagina, after the body is delivered, so as to press upon the right side of the face and temple, and determine the chin of the child from the left anterior to the left posterior inclined plane; thus causing a change, so far as the head is concerned, from a fourth to a second position. (Vide Dystocia.) Care must be taken that such an operation be confined to the second period of this stage—that is, when the head has passed the os uteri, is in the cavity of the pelvis, but has not entered the inferior strait. Under these circumstances, the head is com-

paratively movable, and the body being delivered, readily rotates with the head, and there is no danger, therefore, of injury to the spinal marrow, by twisting the neck. Of course, also, this conversion should be effected solely by the pressure upon the head, and not in any degree by acting on the body of the child. To us it seems very strange that distinguished authors and practitioners, including such names as Baudelocque, Dewees, Meigs, Bedford, etc., should advise the conversion of the fourth position into the second by acting on the body of the child during the absence of a pain. Such a manœuvre may possibly be successful, but must be very inefficient at best, owing to the flexibility of the child's neck, so that not much of the rotatory motion thus given to the body will be impressed upon the head; and it is certainly very dangerous, as such twisting may cause lesion to the spinal marrow.

Should, however, the practitioner find that the rotation has already occurred, so as to throw the occiput posterior toward the hollow of the sacrum, no time should be lost in facilitating delivery, in perfect correspondence with the natural mechanism of labor, already described; for the head being out of the uterus, this organ has contracted sufficiently to suspend the placental functions, and, of course, its contractions can have no further influence on the delivery of the fœtus. The patient, therefore, should be urged to bear down as much as possible, while the practitioner should immediately carry the body of the child backward, (Plate XIII., Fig. 70,) so as to bring the base of the occiput toward the perineum and coccyx; at the same time two fingers of the right hand should be carried to the face, and, if possible, to the forehead, so as to depress the os frontis under the arch of the pubis, thus facilitating flexion, and a speedy delivery. In such cases, these manœuvres are most frequently demanded, when the perineum is rigid, as in first labors: for then the neck of the child is pressed so far forward by the posterior commissure of the vulva, that there is great danger of the forehead, or even of the chin, coming to the arch of the pubis, instead of the anterior fontanel; the base of the cranium, or of the whole head, presenting at the inferior strait, instead of the chin. (Plate XIII., Fig. 69, Plate XXXI., Fig. 153, Plate XXXI., Fig. 154.) This great danger is too often increased by improper traction in the direction of the axis of the inferior strait, or of the orifice of the vagina, almost certainly causing delay, and the death of the child. If, however, flexion be facilitated by carrying the child's body backward, and, at the same time, depressing the mental extremity of the head so as to secure the presentation of the chin, the short diameters of the head will be alone involved; and if the bearing-

down efforts be not sufficient, then traction efforts on the body backward will be very efficient, in accomplishing delivery, the head revolving, on the perineum, as a pivot or centre.

By thus facilitating the natural mode of delivery, the assistance of the forceps will be seldom required, and the child's life more frequently preserved. In cases of greater difficulty more assistance will be demanded, as will be directed in cases of dystocia from mal-presentation.

LEFT SACRO-POSTERIOR POSITION.—In the *fifth* position of the breech the treatment will be precisely similar, excepting that as the hips, shoulders, and head now rotate in an opposite direction, the assistance rendered must be regulated accordingly; and hence, this fifth position, so far as the head is concerned, should be converted, if practicable, into a first position, by determining the chin from the right anterior inclined plane to the right posterior inclined plane.

SACRO-SACRAL POSITION.—In the *sixth* position there is usually no great difficulty in the delivery; still, however, the practitioner should be upon the alert, so as to secure the rotation of the hips from the transverse to the direct position—one hip to the pubis, and the other to the sacrum—and so, also, of the shoulders. This rotation of the body being accomplished, it will almost necessarily result that the occiput will be turned off from the projection of the lumbar vertebræ, and descend into the pelvis in an oblique direction, as in the fourth or fifth position. When this descent has been fairly accomplished, so that the head is in the cavity of the pelvis, between the superior and inferior straits, there can be no risk in continuing this process of rotation of the head, by pressing upon the side of the face and temple. Thus, eventually the chin of the child will be directed from the anterior to the posterior part of the pelvis, and the occiput, which was originally opposed to the spine, will be brought behind the body of the pubis. This rotation, to the extent of a semicircle, is safely made, as the body of the child, being delivered, readily rotates with the head, producing no twist in the spine.

Should the rare accident ever be met with in this sixth position that the head should be engaged at the superior strait, with the occiput toward the sacrum, and the os frontis toward the pubis, a change into the oblique position may still be attempted, or flexion of the head be facilitated, in the manner hereafter to be detailed, under the head of Dystocia. Under the same head, also, will be presented the proper modes of delivery, in pelvic cases, where complications arise spontaneously, or are induced by mal-practice.

TREATMENT OF PRESENTATIONS OF THE FEET.

For reasons already mentioned, these should be regarded as mere varieties of natural labor, seldom of sufficient importance to demand artificial assistance. Nevertheless, as complications may more readily occur than in breech presentations, the practitioner should pay special attention to such cases, even from the commencement of labor, and very seldom absent himself from his patient.

During the first stage, where the bag of waters is occasionally long and narrow, from the os uteri being imperfectly dilated, it is very important to preserve the integrity of the ovum.

If the membranes be prematurely ruptured, not merely the feet, but also the legs and thighs, may be rapidly delivered, and even the hips of the child may pass the os uteri before this orifice is sufficiently dilated by the transit of the shoulders or head. Hence there is imminent danger to the life of the child, the os uteri being not fully dilated, and the contractions of the uterus becoming urgent.

Too much care, therefore, cannot be taken to preserve the integrity of the ovum, by measures already detailed.

Even after the liquor amnii is evacuated, and especially if the os is still unyielding, the practitioner should request the patient, as far as practicable, to suspend her voluntary efforts; and at the same time, by one or more fingers, he should press the feet directly upward, so as to retain the legs and thighs at the os uteri. By this means labor may be retarded, so that the os uteri may be more completely enlarged before any dangerous pressure is made on the umbilical cord, etc. Although this practice might appear to protract the progress of labor, yet it really shortens it, by ensuring more complete dilatation of the os, and of course a more easy and rapid descent of the thorax and head of the infant. No traction, therefore, should be made on the limbs of the child. Of course, the too common practice of regarding these as preternatural labors, and

hence of hooking down the feet and legs, and of pulling on the limbs and body, is unscientific and positively dangerous. The uterus should be allowed to do its own work, at least until there is danger of the cord becoming compressed, or of the shoulders being arrested at the os uteri.

Occasionally, however, some few attentions may be paid to the limbs of the child, after they have descended through the os uteri, so as to prevent their being injured from any unusual position. Subsequent delivery will be the same as in breech presentations.

In the different positions of the feet, no modification of the usual treatment will be required, except the practitioner should always bear in mind that the limbs should not be improperly rotated, and the toes should always be directed toward the anterior part of the child. Also that in the calcaneo-posterior positions of the feet any traction effort which may be demanded should be made chiefly on the pubic limb, in such a manner as gradually to determine the calcaneum from the posterior to the anterior part of the pelvis, so that the occiput, as it descends, may be turned from the posterior to the anterior portion.

TREATMENT OF PRESENTATIONS OF THE KNEES.

These very rare presentations are to be treated upon the same principles,—preserving the bag of waters; retarding the premature descent of the legs and thighs; restraining the natural disposition to bear down, until the os be dilated; avoiding traction efforts on the limbs, and very generally allowing them to descend through the pelvis and vagina without assistance. Occasionally some aid may be given, if the descent should be unnecessarily prolonged by some mal-position of the legs at the os uteri or the cavity of the pelvis. If, from any cause, assistance should be rendered, the accoucheur should bear in mind that the anterior portions of the tibiæ represent the posterior portions of the child.

CHAPTER XI.

EUTOCIA.—TREATMENT OF THE MOTHER AND CHILD AFTER LABOR.

SUCH is the history and treatment of Natural Labor. The practice of the accoucheur rests upon the fundamental principle that Labor is a physiological process, and therefore, *per se*, not demanding artificial assistance. Nevertheless, the constant attention and supervision of the accoucheur is requisite to determine that the labor is, in every respect, normal; to detect immediately any deviation from this natural process, and of course to be prepared to furnish the proper relief; and, moreover, to guard the woman from the innumerable suggestions constantly presented by ignorant attendants or anxious friends.

The same negative influences are equally important after parturition.

CONDITION OF THE MOTHER.

After this important epoch many and wonderful changes are successively observed, both as regards the general system, and the condition of the uterus and other pelvic organs.

General System.—Let it be remarked that the same excitable or irritable condition of the nervous system, which existed during gestation, still continues, frequently aggravated by the sufferings, anxieties and exhaustion of a protracted labor; and also, that the plethoric condition, characteristic of pregnancy, although lessened by profuse perspirations during labor, and by the quantity of blood frequently lost after the separation of the placenta, still has seldom entirely disappeared.

The patient is therefore *nervous*, mentally and physically; slight circumstances disturb her mind, often excite headaches, and occasionally neuralgic pains about the face, chest, and abdomen, but more particularly in the uterus. There are sometimes sensations of numbness, a disposition to tremor, nervous chills, and occasionally cramps or spasms. In other cases there is great languor, feelings of exhaustion, as if she could not live, accompanied with more or less pallor of the surface, coldness of the extremities, and a weak and frequent pulse. In a few instances the symptoms

of exhaustion become alarming, and sometimes they prove fatal, where there has been no hemorrhage, and no inflammatory or other lesion. This "nervous shock," as Dr. Churchill terms it, is, however, seldom serious; a reaction generally ensues, so that bad consequences are prevented.

Still, however, all this nervousness predisposes to every variety of hysterical and convulsive affections. A lady, for example, under the care of the author, immediately went into convulsions on hearing that she had given birth to twins.

The *vascular* system is temporarily prostrated after delivery. This arises partly from the profuse secretions from the skin induced by the parturient efforts, and from the loss of blood after delivery; but mainly from the collapse which always ensues after violent muscular efforts, and the inordinate excitement of the heart and arteries. There are few women, therefore, whose circulation is not more or less depressed for half an hour or an hour after delivery, and sometimes for a much longer period. This is evinced by the cessation of perspiration, paleness of the skin, coldness of the hands and feet, and the weakness and depression of the pulse.

Soon, however, *reaction* ensues; the hands and feet become warm, the pulse full and regular, the color returns to the face, the features brighten, and the patient expresses herself as feeling very comfortable in mind and body. In healthy conditions this reaction is followed by a free return of all the natural secretions, especially of the skin and kidneys; perspiration is abundant, and very generally large quantities of urine are evacuated. The *œdema gravidarum*, often so great during gestation, disappears with wonderful rapidity, not merely from the face and arms, but also from the lower extremities, so that even in a few days these dropsical effusions appear to vanish. Also in more serious cases, where water has been collected in the chest or abdomen, its absorption has been effected in a few days or weeks after delivery. In the case of dropsy of the ovary, already alluded to, which, commencing during pregnancy, left the patient with a very

large abdomen after the birth of her child, the swelling gradually but slowly diminished, so as to leave, in the course of two years, very slight vestiges of its existence. The patient now, about six years after her confinement, is in the enjoyment of good health.

There is not the same disposition in the liver and intestines to resume their natural secretions; the bowels are apt to be torpid, and the liver inactive for some days. This even is transitory, and their functions are speedily and readily resumed, so that the appetite and digestion are soon re-established.

This normal condition in the circulation continues for two or three days; then not unfrequently the reaction becomes still greater, so that the patient is often rendered uncomfortable. Occasionally there are slight, chilly sensations, or even rigors, with uneasiness about the head and spine, sometimes amounting to pain; the skin becomes warm, with sensations of fulness and oppression, especially about the chest. Sometimes all these symptoms are so severe, that a decided fever is manifested.

This natural irritability of the nervous and vascular systems generated by pregnancy, and enhanced by the parturient efforts, predisposes to all the varieties of nervous and inflammatory affections. Not only, therefore, are women often hysterical after delivery, but not unfrequently they become the subjects of local inflammations, especially of the pelvic organs. Vaginitis, therefore, is not very uncommon. In some instances Metritis is met with, and still more frequently Peritonitis, Ovaritis, and even Uterine Phlebitis; all of which are intimately connected with those varieties of febrile affections usually designated as "Child-bed fever."

Such accidents generally occur during the first four days after delivery. In our experience they are comparatively rare if a full mammary secretion has been established, which may therefore be regarded as the crisis of the parturient state.

Mammæ.—It has already been mentioned that, during pregnancy, there is not only a congestion of the mammæ, but also more or less secretion of milk. At delivery there is very universally some fluid in the breasts, enough to supply the wants of the infant. This first milk is thought to be peculiar, and to possess some laxative properties. It is often termed the "colostrum." On the second or third day the mammæ become more turgid; the lobules, and even the lactiferous tubes, can be felt, under the cutaneous and adipose tissues, enlarged and distended; and the secretion of milk is augmented. When, however, the reaction already described ensues, there is a rapid turgescence and swelling of all the mammary tissues, which become hard and painful.

This sudden afflux of fluids to the breast is followed by an abundant secretion of milk for the supply of the new-born infant. This is sometimes even inordinate, so that large portions of this fluid are often excreted without the assistance of suction to the nipple.

Usually this profuse excretion relieves the congestion of the mammæ, the febrile symptoms disappear, and the patient returns to her normal condition.

Lactation, thus established, affords great relief to the animal economy; all symptoms of nervous and vascular excitement disappear. The woman, having a good appetite and good digestion, rapidly regains her health and spirits, and for many months often enjoys more strength and vigor of body, and more mental and moral happiness, than at any other period of her married life.

The *milk fever*, as thus described, is occasionally troublesome and persistent, being kept up by engorgements and the formation, in portions of the mammæ, of hard lumps or swellings, "cakes," dependent on imperfect secretion and excretion. Not unfrequently these are followed by positive inflammation, induration and suppuration, with great decrease and often entire suppression of the mammary secretion, and by the formation of abscesses, often large and numerous, which, for weeks or months, prove very tormenting and exhausting.

Many women, especially among the higher walks of life, have comparatively no determination to the breasts, and therefore little or no secretion of milk. This is unfavorable, according to our observation; for although many such women do well, yet, as a general rule, there is a slow "getting up." The patient is languid and weak, she has no appetite, and soon becomes pallid and anæmic. In other instances local congestions or inflammations ensue. Hence, not unfrequently Ovaritis, Metritis, Enteritis, Phlegmasia dolens, etc., are the results. We cannot agree, therefore, with those who maintain that women who have no mammary secretion do as well as those in whom this important function is established.

Organs of the Pelvis.—While the above detailed transformations of the general system and the breasts are progressing, changes of an opposite character are manifested in the pelvic tissues. These become depressed as the mammæ become excited; there is a gradual transference of irritation. The excitement of the pelvic organs, instituted and perpetuated by pregnancy, now rapidly disappears; pressure is removed, and with it all passive congestions. The child being expelled, and the uterus contracted, there is no longer any extraordinary demand made upon the nervous or vascular system of these tissues.

The active excitement is not only thus negatively diminished by the cessation of gestation, but also positively by the hemorrhage, more or less copious, which follows the separation of the placenta, and by the subsequent discharges, continuing for many days, and sometimes for weeks after parturition.

Lochia.—These discharges, which are usually denominated the “Lochia,” sometimes “Purgations,” or “Cleansings,” consist, for the first two or three days, of blood, which gradually assumes a seroid character, and is occasionally of a greenish color, and in the nursery has been termed the “green waters.” This is generally intermixed with mucous discharges from the vagina and uterus, and occasionally is said to be purulent.

On the occurrence of milk fever the lochia generally diminish, but subsequently return. After the sixth or seventh day they are no longer red, and with many women rapidly diminish; while with others they continue to the second and third week. On the fourth week, however, there is a disposition to return, not merely of a white or yellow, but also of the red discharge, which lasts, however, only a few days, and does not reappear usually for many months, until the natural menstrual excretion is re-established. The return of the menses, as a very general rule, does not occur during lactation. To this there are many exceptions. In civilized life the time is not often extended beyond nine or twelve months.

There are numerous circumstances which influence the duration of the lochia, such as congestions or inflammatory affections of the uterus and its appendages, irritations arising from states of the rectum, displacements of the uterus, deficiency or absence of the mammary secretion, and disturbances of the general, nervous, or vascular systems.

From similar causes, the character of the discharge also varies, being sometimes acrid, irritating, not unfrequently of an unpleasant odor, and occasionally very fetid. The cause of this fetor often arises from the retention of the lochial discharge which may become putrescent, and sometimes from inflammations of the mucous membrane. This putrescent character has been referred by M. Cazeaux and others to a gangrenous state of the tissues. We have certainly, however, noticed great fetor where there was no evidence of gangrene. It also probably depends on certain states of the blood, and of the general system of the patient, analogous to what is often perceptible during the flow of the catamenia.

Irritation of the uterine system being thus diminished by the removal of the child, and by the hemorrhagic and lochial discharges, other changes rapidly ensue.

The *uterus* will be found greatly diminished after labor, measuring about eight inches in length, and five or six in breadth. The size, however, varies in consequence of the degree of congestion of the blood-vessels which may remain, the want of proper contraction, the presence of coagula, etc. In healthy women there is a rapid diminution of size, so that the organ at the ninth or tenth day has sunk from the hypogastric region into the pelvis, the fundus, at this time, extending an inch or two above the brim of the pelvis. The process of diminution in the size, and, of course, the descent of the uterus, continues with varying degree, so that by the fourth or sixth week it resumes its ordinary dimensions and location in the cavity of the pelvis.

The volume of the uterus thus decreases in consequence of the disappearance of vascular congestion, also from the continuance of uterine contraction, and, it is said, from the alteration, or even degeneration of the muscular fibres. Retzius and others assert that a fatty degeneration ensues after parturition. Finally, the hard, dense character of the virgin uterus is regained. The uterus, however, remains somewhat larger, and its cervix more cylindrical and wider than in the virgin.

Changes also occur in the mucous membrane of the uterus, which have been variously described by authors; but, in the course of a few weeks, its peculiar characters are fully reinstated.

The ligaments of the uterus, which had been so enormously extended during gestation, gradually return to their pristine dimensions, so as to afford a proper support to the uterus. This natural disposition to contract is, however, frequently interrupted by many causes, especially by over-distension of the bladder, by the increased weight and size of the uterus, by pressure from the intestines, by contractions of the walls of the abdomen, especially in standing, straining, vomiting, etc. All these circumstances have a tendency to displace the uterus, and thus to prevent that contraction of the ligaments so important for the future comfort of the patient: they are thus often productive of severe local affections, and spinal and cerebral irritations.

The *Fallopian tubes* also return to their natural position and size, and their congestion disappears.

The *ovaries* also gradually lose their vascular character, and, of course, in a few weeks even the corpora lutea disappear, leaving the original bed of the vesicle contracted, while a small white spot, like a cicatrix, marks its former position. There is reason to believe, however, that these corpora lutea, probably owing to irritations caused by labor, sometimes remain congested, become inflamed, and may be the exciting cause of puerperal ovaritis, peritonitis, etc.

The *vagina*, after labor, is thrown into folds, although there is considerable contraction in its tissues. In a short time all these folds disappear, and the condensation of the tissues continues for four or six weeks; it seldom returns, however, to its original dimensions. In multiparous patients it is sometimes very much relaxed, even after many years. In others, the condensation is greater, so as to approximate the virgin condition.

This canal is more liable to inflammation than any of the other tissues of the pelvis in consequence of the great pressure and distension which it has sustained, and of the occasional contusion and laceration of its exterior orifice; the *frænum perinei* being generally torn in the first labor, and, not unfrequently, portions of the *vagina* itself.

The *bladder* is often torpid or semi-paralyzed, from previous distension, so as to prevent the excretion of urine. This retention, however, is often caused by a swelling of the *urethra* produced by pressure. A similar torpor is occasionally manifested in the *rectum*, and also in the whole intestinal canal. Generally, however, the functions, both of the bladder and intestines, are executed without any difficulty.

The *walls of the abdomen* are greatly relaxed after delivery. This relaxation diminishes slowly by the physical and vital contractility of their tissues; but many weeks elapse before even the muscles resume their ordinary degree of contraction, while the skin and the areolar tissues, especially in multiparous women, remain permanently soft and distensible, and occasionally become pendulous. In some women large quantities of adipose matter are deposited. The *umbilicus*, which has been stretched during pregnancy, generally contracts, but sometimes remains patulous, predisposing to umbilical hernia.

After-pains are frequently met with; but ordinarily it may be presumed that no pain or irritation should exist after parturition. Hence, in healthy women, after their first labor, this is the case. But in multiparous women, and occasionally even in primiparous, soon after delivery the patient complains of a return of pain, similar to that of labor. It is generally situated in the hypogastric region, but occasionally extends to the back, and down the limbs. This pain is intermittent, continuing for a few moments, and after longer or shorter intervals returning. It is accompanied with sensations of fulness and pressure. The uterus may be recognized as becoming hard, and the fundus more prominent in the hypogastric region. When the pain ceases, the uterus relaxes, and the fundus again sinks. The intervals between these after-pains are very varying, from a few minutes to a few hours;

sometimes they commence immediately after the birth of the child, and occasionally not for six or twelve hours. They are often trifling, but not unfrequently very severe; they are sometimes followed by the discharge of coagula per vaginam.

The duration of after-pains usually extends to two or three days, sometimes to five or six; most frequently they disappear when the mammary secretion is established, and very often, according to our experience, after a free evacuation of the bowels.

The causes are not always evident; they are generally referred to imperfect contraction of the uterus; hence, they are seldom observed in first labors, where such contractions are supposed to be more complete. It is said also, that they are more frequent after very rapid deliveries, and where there is relaxation or inertia of the uterus. There can be no doubt that the presence of coagula in the uterus, or even in the *vagina*, is a common exciting cause, as they irritate the organ, and stimulating it to contraction. This is remarkably the case when the pains come on soon after delivery, when they are severe, and recur quickly, especially if their severity increases, and the sufferings extend to the "small of the back," with sensations of fulness and weight. This variety will be almost instantaneously relieved by the removal of such coagula. Similar phenomena result from retention of portions of the placenta, or even of the membranes in the uterus or *vagina*.

After-pains are also excited, or, at least, aggravated by putting the child to the breast, and by irritations of the stomach and bowels. Hence, gaseous or feculent accumulations excite or keep up these sufferings. They, also, are often dependent on distension of the bladder, or irritations in the *vagina* or rectum. They are aggravated by local inflammations, by great vascular congestion or excitement, and by cerebro-spinal irritations. Hence, mental and moral emotions very often excite uterine pains after parturition.

These after-pains are seldom, if ever, productive of inflammation or fever; nevertheless, they are very injurious, not merely from the degree of suffering produced, which is often great, but also from preventing sleep, inducing restlessness, and exciting the whole nervous system; the patient becomes fretful, anxious, hysterical, and sometimes even delirious. Some authors have regarded them as useful, as condensing the uterine fibres, and expelling coagula, portions of the placenta, etc. Experience proves, however, that the natural tonic contractions of the uterus are adequate for these purposes, and hence, severe pain or spasms are unnecessary.

By careful attention to their characteristic symp-

toms, there will be usually no difficulty in recognizing the nature of these pains. Nevertheless, they have been mistaken for those severe sufferings which are attendant upon puerperal fever, and which are indicative of inflammation. The difficulty becomes greater, inasmuch as these after-pains often precede or are co-existent with such inflammations.

In *metritis*, *peritonitis*, or *ovaritis*, the pains are generally persistent, although accompanied with aggravations. There are also much soreness and great intolerance of pressure frequently associated with tympanites. Such inflammatory pains are attended with the common symptoms of fever, such as chilliness, heat and dryness of surface, frequent and excited pulse, with a diminution of the lochia and of the mammary excitement and secretion, etc.

These after-pains are evidently of a neuralgic or spasmodic character; and sometimes, especially when excited solely by mental or moral impressions, by suction of the infant, or by irritations of the alimentary canal, there is reason to believe them purely neuralgic, without any unusual contraction or spasm. More frequently, however, actual cramp of spasm of the muscular fibres exists, resembling the pains of labor; this is useful for the expulsion of coagula or any foreign substance which may be present.

The nervous character of these pains is evident from their severity, their intermission, the complete relief experienced on their cessation, and the absence of all febrile or inflammatory excitements. Hence, Continental accoucheurs term them "*uterine colics*," as being analogous to spasmodic affections of the intestines; and the word "after-pains" indicates that they are similar in their character to the "pains of labor." Uterine Neuralgia and Spasm would be appropriate titles.

A variety of after-pains is described by Dr. Dewees as consisting of a sense of weight, pressure, soreness, and even pain at the extremity of the coccyx, and in the course of the rectum. In a minor degree these sensations are not uncommon; they are not unfrequently felt by males as well as females, after a very large evacuation of hardened feces from the rectum; in both cases being evidently caused by the great pressure to which the perineal tissues have been subjected.

TREATMENT. — General System. — The treatment should be founded upon the facts and views just presented.

The great irritability of the nervous and vascular systems generated by pregnancy and labor, and predisposing to nervous and inflammatory irritations, should never be forgotten.

As soon, therefore, as labor is over, the binder applied, and the patient placed in a comfortable position in bed, all sources of mental and physical excitement should be removed. All company should be excluded, and conversation forbidden; the room should be darkened so that the patient may have an opportunity of recovering her energies by rest and sleep. The room should be well ventilated, and be kept at a moderate temperature through the instrumentality not of stoves or furnaces, but by means of "open fires," which, while they give sufficient heat, prove to be the best ventilators. Curtains may be allowed to the windows and occasionally to the corners of the bedstead, but should never be dropped around the bed.

The *diet* of the woman should always be "low," that is, of simple farinaceous articles, neither hot nor cold, as the former might prove too exciting, while cold drinks might cause intestinal or uterine pain. The objections to a full diet are the predisposition to inordinate reaction, which might result not only in "milk fever," and mammary inflammations, but also in the more severe forms of ovarian or peritoneal inflammation, etc.

No attention need usually be paid to the *bowels* for two or three days after delivery, unless there be an unusual accumulation of gaseous or feculent matters, when a simple enema will be very useful. Should, however, the torpor of the intestines continue for two or three days, a laxative medicine should precede the natural disposition to congestion of the breasts on the third or fourth day. Such predisposition to inordinate excitement is often prevented by removing irritations from the alimentary canal, and by hastening the biliary and other secretions.

The greatest attention should be paid to *cleanliness*, by frequent changing of napkins, sheets, etc., and also the garments of the patient. The free use of warm water with soap or other alkaline articles to the pudendum should never be neglected. Much may be gained also by the external application, after washing, of simple unguents, lard, lime-water and oil, etc., and occasionally, it may be, of warm fomentations and poultices, especially if there be much swelling or tendency to inflammation.

The patient should be kept constantly in the recumbent *position*, not being allowed to sit up even when the bowels or bladder are to be emptied. The necessity for this rule is, we think, urgent, as there is danger of producing weakness or syncope from the exertion, and occasionally of re-exciting uterine hemorrhage. Moreover, the uterus being large and heavy, and the ligaments elongated, there is danger of its premature descent to the lower parts of the pelvis; and if there

be any predisposition to inflammation, it will be greatly aggravated by every muscular effort. It is customary with most practitioners here and elsewhere, to allow patients to sit up after the eighth or tenth day, and soon after to commence walking. We are confident, however, that it is advisable to maintain the recumbent position almost constantly for about four weeks, and at the same time to avoid all straining efforts at stool, etc. This rule is founded on the facts already mentioned, that the uterus does not recover its natural size nor its ligaments their normal length and tonicity until four to six weeks after confinement. Hence, if premature muscular efforts be made prior to this period, there is great danger of causing prolapsus, retroversion, or some other displacement of the organ, which often embitters life for many years; perhaps most women date the origin of their troubles in this respect from one of their labors. On the contrary, if they remain quiet, the natural disposition of the ligaments to contract after delivery may prevent these unfortunate accidents.

By careful attention to these hygienic rules, most women will be comfortable, and have a safe "getting up."

Sometimes, however, there is great prostration immediately after delivery, with or without nervous chills, tremors, rigors, etc. This demands immediately stimulants, such as wine, brandy, etc., in combination with farinaceous food, animal broths, etc. The "*Nervous Shock*" requires not merely alcoholic stimulants, but also narcotics, to quiet nervous excitement, restlessness, pain, etc., and often to procure sleep, which is the best restorative. Mild articles should generally be preferred, but not unfrequently the various preparations of opium may be demanded. These last may be exhibited either alone or in combination with diaphoretics or laxatives.

Narcotics also must be exhibited in purely nervous or hysterical cases where there is no "shock" or prostration: they become still more important, should uterine spasms or after-pains be present.

After-Pains.—The treatment of these spasms may generally be entrusted simply to narcotics. The fears entertained that they may do mischief by preventing proper contraction of the uterus, and thus facilitate hemorrhage, we think unfounded. In ordinary doses they diminish inordinate action, but allow the natural contractility of the uterine fibres to be sufficiently exercised.

Nevertheless, the practitioner should always be upon the alert to detect any aggravating causes of these uterine pains. If, therefore, soon after delivery, there be almost constant pain extending to the back, and especially with sensations of weakness or faintness, there is rea-

son to suspect an accumulation of coagula, even where there is little or no discharge externally. All such coagula should be immediately removed from the vagina, and, if necessary, from the uterus, the further contractions of which may be hastened by the pressure with the hand externally upon the body of the uterus. This removal of coagula generally affords complete relief, which may be maintained by means of an opiate.

If, however, feculent or gaseous accumulations in the intestines exist, enemata, and, subsequently, the exhibition of laxatives, will be very important. The bladder also should be attended to within a few hours after delivery, and, if necessary, emptied by the catheter.

All mental and moral excitements should receive attention, as among the aggravating causes of after-pains. Also, if there be any evidence of vascular congestion or plethora, and especially if there be any signs of inflammatory action or fever, decided evacuations, even by means of the lancet, are often important for the safety of the patient.

These neuralgic spasms may often be prevented or moderated in women who have been liable to them after previous labors. Such prevention may be effected by facilitating complete contraction of the uterus. The practitioner may occasionally, therefore, retard the too rapid delivery of the infant. He should avoid, after the head has passed, dragging away the body of the child, but wait for another bearing-down effort. He should insure the contractions of the uterus by frictions and pressure immediately after the birth of the child, and afterward wait, for half an hour or more, for the natural contractions of this organ for the expulsion of the placenta. After the delivery of the placenta, further frictions will be advisable to maintain the contractions of the uterus.

After-pains may also be prevented by obviating any disposition to nervous or vascular excitement; and by careful attention to the stomach or bowels even before labor commences.

In the variety of after-pains noticed by Dr. Dewees, from pressure on the rectum and perineum, this gentleman commended camphor injections into the rectum; if this be not sufficient, laudanum enemata may be substituted.

Mammæ.—Mammary irritation and congestion, which is apt to supervene on the fourth day, may be moderated by the previous exhibition of laxative medicines, but especially by putting the child early to the breast, and allowing it no other nourishment but the mother's milk. Should the congestion be inordinate, suction, not only by her own infant, but by another child, by the nurse, or by artificial measures, will be important,—care being taken not to injure the breasts by undue

manipulations, or by pressure from the clothes of the patient. The effect may be increased by warm fomentations, poultices, etc., and sometimes, even, by leeches. The practice, often too common with nurses, of resorting to cool astringent or other revulsive measures to the breast, should be forbidden, as tending, by diminishing the secretion, to increase the disposition to inflammatory engorgement, or to determine irritation from the mammae to some other organ. Anti-febrile remedies, including not only leeches, but the lancet, are sometimes demanded if the milk-fever be great. Should, unfortunately, suppuration occur, the abscesses should be treated according to the common rules of surgery.

After the secretion of milk is established, and the febrile excitements have disappeared, a good nutritious diet, including animal food, may be allowed; and if the patient be weak, tonics, malt liquors, and sometimes wine or other stimulant may be administered: while great attention is to be paid in maintaining the regular evacuation of the bowels, and the various secretions and excretions of the body.

Should, however, the mammary secretion be deficient or absent, the cause, if possible, should be ascertained; if from peculiar temperament or constitution, or even from mere debility, the patient may do well, but, nevertheless, she is more liable to irritations of other organs. Hence, much attention should be paid to keep up a free secretion from the uterus by warm applications, fomentations, and warm vaginal enemata. The bowels should be attended to, laxatives may occasionally be administered; sometimes diaphoretics and diuretics are important. At any rate the patient should be clothed warmly, and her diet should be nutritious, but not too stimulating.

The non-appearance or the disappearance of milk is occasionally indicative of serious lesion in the uterus or other organs, or of some morbid state of the patient, and should immediately receive suitable attention.

Uterus.—The condition of the uterus sometimes requires treatment, particularly as regards its discharges. Premature diminution, or sudden disappearance of the Lochia, is often an unfavorable sign. Its return should be facilitated by warm vaginal injections, fomentations, etc.

The lochia are occasionally inordinate, and sometimes endure for several weeks, or even months, keeping the patient weak, nervous, and often diminishing the proper supply of nutriment for the child. The causes should be carefully investigated; if from the presence of coagula, portions of the placenta or membranes, they should be removed; if from imperfect contractions of the uterus, stimulating frictions on the hypogastric region, tepid, cool, or even cold and astringent

vaginal injections may be employed, and sometimes the exhibition of small but repeated doses of the *secale cornutum*. If the lochia be maintained, as is not unfrequently the case, by prolapsus or retroversion of the uterus, such displacements should be obviated. If there be any local inflammation of the vagina, os, or cervix uteri, the usual remedies for inflammation should be employed; while fungous growths or polypi, if accidentally present, should be removed. All mental and moral excitements should be obviated, while the patient's general health and strength should be maintained by a nutritious diet and tonics; and in chronic cases by bathing, exercise out-of-doors, and by the use of malt liquors, wine, etc.

Should the lochia be thin, acrid, and fetid, in addition to our general remedies, large and frequent injections into the vagina of tepid water, infusions of red roses, of chamomile flowers, of flaxseed, of slippery elm bark are important, to be followed by astringent washes, such as weak solutions of alum, sulphate of zinc, nitrate of silver, acetate of lead, and especially by the chlorides of lime and soda.

Walls of the Abdomen.—Immediately after delivery a compress and binder, as already recommended, should be applied to the abdomen. The question how long any bandage round the abdomen should be worn is not easily decided. Many practitioners object to it altogether, while others allow patients to wear them under the name of "abdominal corsets," or "supporters," for an indefinite length of time. Both extremes should be avoided. A proper binder or abdominal corset, moderately tight, is, we conceive, useful for a few weeks after confinement, until the natural tonicity of the muscles be restored. It is useful by supporting the relaxed parietes of the abdomen, and facilitating their natural disposition to condensation and contraction; and also by giving a proper support to the viscera of the abdomen. It thus obviates, to a considerable degree, the deformity and inconveniences of a pendulous abdomen, and, to a certain extent, the tendency to umbilical and ventral hernia. Of course it may be abused by being applied too tightly, so as to compress the viscera, depress the uterus, and predispose, it may be, to inguinal or crural hernia, etc. When moderately employed, and not too long persevered in, the bandage will be found very advantageous.

CONDITION OF THE CHILD.

The history of the new-born infant is very interesting.

The cause of the first inspiration has excited much discussion. There can be but little doubt that it is

owing to the impression of atmospheric air upon the surface of the body, and especially upon the face. Strong children may even make efforts to breathe after the birth of the head, while the body is still retained; and cases are reported of "*vagitus vaginalis*," and even of "*vagitus uterinus*." Marshall Hall states that the impression, thus made, is due to the excitement of the trifacial and other nerves of the surface of the body, producing a reflex action; but that, after respiration is established, it is kept up by a reflex action due to the irritation of the pneumogastric nerves in the air vesicles of the lungs. Hence, the degree of sensibility of the skin must hasten or retard the first inspiration.

The child, when born, has a bluish or violet color; this rapidly disappears. In a short time, however, after washing and dressing, the whole surface becomes warm and of a scarlet tinge. In a few days this redness diminishes, and although the skin remains warm, it becomes of a yellowish color, which occasionally deepens, so much that the infant is considered as jaundiced. Hence we read of the *icterus infantum*, which is usually of little consequence. But sometimes the appetite fails, digestion is very imperfect, emaciation, debility, and complete exhaustion may ensue. This, however, is a rare circumstance: generally a reaction soon takes place, the infant profits by its nourishment, the yellow tinge of the surface disappears, and the natural white complexion is established. This event usually is accomplished in the course of a week or ten days, but occasionally is delayed for three or four, or even six weeks.

The *causes* of these changes are not evident, but they are doubtless connected with the altered condition of the child's blood, necessarily produced by the change in its mode of living; instead of being sustained in utero by absorption through the medium of the placenta, it is now supported by nutritious matters demanding the usual process of digestion. It is possible, also, that something depends on the torpor of the liver; for it is found that, when the secretion of bile, which was very trifling during foetal existence, is abundant after birth, and rapidly discharged from the bowels, the yellow tinge of the surface is comparatively trifling, while in other instances it is much more decided.

The *urinary discharge* sometimes appears immediately after delivery; in other instances it is delayed for a few hours. The same is true as regards the *alvine evacuations*. These, in the young infant, consist of tenacious, mucoid matters, and are of a dark, greenish or black color, and are termed "*meconium*." This is altogether unirritating, and no bad consequences appear to arise from its presence in the bowels, con-

trary to the impression of nurses, who attribute all kinds of evil to its retention. In the course of a few days, after food has been taken, it is carried off, being succeeded by regular feculent discharges, which are of an orange color, semi-fluid, and comparatively devoid of fetor.

The *umbilical opening* is kept distended in the foetal state by the blood-vessels, and contracts after delivery until it becomes completely obliterated; while that portion of the skin, which projected on the umbilical cord, also contracts, and finally disappears, being thrown into folds, and constitutes the dimple in the linea alba, which remains during life. The stump of the umbilical cord dies, and, in the course of five or ten days, sloughs off close to the proper tissues of the child; while the umbilical vessels, within the abdomen, rapidly diminish, and, eventually, the remains of them can hardly be detected.

If, therefore, the infant be healthy, and be furnished, at regular intervals and in moderation, with the nutriment, prepared by the *mammæ*, digestion is effected without uneasiness or pain, nutrition is active, and the child grows very rapidly in strength and size. It usually becomes fat, and by the end of three months often doubles its weight; while all its animal functions are daily more and more developed.

MANAGEMENT OF THE CHILD.—The management, therefore, of the young infant is exceedingly simple. Having been washed and dressed, it may be placed to the mother's breast, she being in a condition to receive it; if not, a little sugar and water may be administered as drink, and the child being warmly covered, should be kept quiet, that it may be refreshed by sleep for one or more hours. Subsequently, attention should be paid to its excretions, and especially to cleanliness, by frequent ablutions and changes of napkins. Its body should be completely washed every morning and evening, best by immersion in a warm or tepid bath; and the natural disposition to sleep should be encouraged, keeping the room quiet, and removing all sources of excitement.

As to *dress*, no tight ligatures or bandages should be applied, the surface should be kept warm, but not so heated as to induce perspiration; and particular attention should be paid to keeping the feet warm, and the head comparatively cool. Hence, while flannels and socks may be applied to the extremities, no caps or other covering should be placed on the head. A hard rather than a soft pillow should be furnished, so as to prevent great heat and profuse perspirations about the head and neck, which predispose the infant to catarrhal affections.

The "new-born" requires no laxative medicine. The first milk of the mother, the "colostrum," is generally regarded as slightly laxative; and, subsequently, the milk, when well digested, assisted by the various intestinal and biliary secretions, keeps up a regular peristaltic motion of the bowels.

The dressing of the umbilicus demands no other attention than keeping the parts clean, so as to prevent the skin being irritated by the putrescent discharges from the cord. If there should be some irritation or inflammation about the umbilicus, warm fomentations, poultices, or simple ointments will alone be requisite.

Occasionally, even in healthy children, *secondary hemorrhage* occurs about the time the cord sloughs. This is a serious accident, and sometimes proves fatal. It can usually be checked by the use of styptic washes and cold applications, or by touching with solid nitrate of silver. Ligatures have been recommended; but it is very difficult to apply them, and they will generally be inefficient from the sloughing and the inflamed condition of the tissues. They are dangerous also, as they might embrace portions of the peritoneum. M. Dubois has resorted to hare-lip pins and twisted sutures; this, although it arrested the hemorrhage, was followed by death in two cases. It has been recommended to fill the opening of the umbilicus with plaster of Paris. The author's experience is, however, decidedly in favor of using very fine lint, small dossils of which should be applied to the bleeding surface, each portion being firmly pressed with the point of a probe. Coagulation is thus effected, and the lint occupying the umbilical orifice, should then be secured by a small compress, supported by adhesive plaster.

As to the *nourishment* of infants, there can be no doubt, that the supply furnished by nature is the best. It alone is all-sufficient; nothing else should be given certainly, for eleven or twelve months, and, in the author's opinion, for two years, or until the second summer has passed. This opinion has not been hastily formed; of course, it is founded upon the supposition that the mother is healthy, strong, has a good appetite and good digestion, and a full supply of milk. Under these circumstances, from numerous observations, he is perfectly satisfied that if the child be kept exclusively upon the breast, it will be abundantly nourished, be fatter, stronger, more lively, and more free from the usual infantile diseases than children that are supplied with an artificial diet; the mother's milk is food and drink for her child. It is exactly adapted to its powers of digestion, and better than anything else facilitates its development.

There are doubtless many exceptions to this general declaration, especially among the delicate and luxu-

rious. Many women have no nourishment for their infants; some can nurse them for two or three months, others for nine or twelve months. Much, therefore, must be left to the experience and judgment of the practitioner, who should carefully watch the condition of the infant, and also that of its parent; bearing in mind that, even if the infant thrive, the health and strength of the mother should not be sacrificed to the welfare of the child. In all such instances, it will be best, if possible, to procure a "wet-nurse," which, while it saves the mother, will still afford nature's nourishment to the infant.

In our large cities, where hundreds of infants annually perish from diarrhoeas, dysenteries, cholera infantum, and from convulsions, the value of the advice now given cannot be over-estimated.

Much mischief is done from the over-anxiety of mothers and nurses to nourish the child. They imagine that the more frequently it is nursed, the better; forgetting that the powers of the stomach are limited, that the superabundance of milk must be either thrown off, or that being retained, it will ferment with a development of acrid and gaseous matters. Hence, arise colics, vomiting, diarrhoea, etc. To prevent these evils the child should be "put to the breast" at regular intervals, about every three hours during the daytime, and every six hours after dark. These intervals are not too long, and may often be advantageously prolonged.

Should, however, the infant be so unfortunate that a wet-nurse cannot be procured, its best diet will be the cream from cow's milk diluted with twice as much water, or the decoction of barley, rice, or other farinaceous articles. This food should be taken by the process of suction.

Under the influence of a suitable diet, with attention to bathing, cleanliness, etc., the yellow tinge, or "yellow gum" as termed by nurses, generally disappears in a few days, although it may continue longer with impunity. When, however, a decidedly jaundiced condition exists, with emaciation or debility, we have found the best practice to consist in giving small doses of castor oil every day. It seems to operate by removing all gastric or intestinal irritations, and promoting a more free secretion from the mucous membranes, the alimentary canal, liver, etc. The appetite improves, digestion is better, and the whole system reacts. It will be imprudent to give the child much nourishment, even from the breast; a little maternal milk diluted by water, with the addition of some brandy, or even mucilaginous fluids, are generally best suited to its digestive powers. The practice of exhibiting alterative doses of calomel or other medicines, as in organic dis-

eases of the liver, is seldom, if ever, necessary in icterus infantum, and not unfrequently is injurious. When reaction occurs, the child generally thrives very well. Occasionally, however, reaction is followed by a slight papillary eruption, termed by the nurses "red gum." This demands cooling regimen, free exposure to fresh air, tepid bathing, mild laxatives, and a moderate supply of food.

DISORDERS OF THE CHILD.—Children, however, are not always born in a good condition. They are occasionally not properly developed, weak, and emaciated. In other instances, the child is injured more or less during the process of labor, so that respiration is not duly established, and the infant is apparently dead. The former state may be denominated "*asthenia*," the latter "*asphyxia*." There is still another state, although comparatively rare, in which the child is presented at birth, that of *syncope* or faintness.

Asthenia.—This is chiefly observed in premature infants, but occasionally in those when born "at term," either from the condition of the parent or from the deficiency of vital power in the infant. The appearance of the child varies; it is generally emaciated, features contracted and sharp—the whole countenance resembling that of an old person—the skin, lips, tongue, etc., are bluish, the hands and feet cool, and respiration imperfect. There is no cry, but constant groaning, with a mucous rattling in the throat, trachea, and bronchia. Pulsations in the heart and cord are feeble, muscular action trifling, the child being quiescent, and apparently in a suffering condition. All these symptoms indicate a deficiency of vital power, "*asthenia*," with more or less congestion about the brain, lungs, and other viscera. Such infants often perish, and, *post mortem*, there are strong evidences of venous congestion in the cavities of the body, and sometimes effusions. These have been found on the surface and base of the brain, and rarely, says Cruveilhier, in the ventricles. They occur also in the bronchial tubes, cavities of the pleuræ and pericardium; and Andral and Billard say on the surface of the liver, under the peritoneum.

Children, however, born prematurely, often survive, especially where the evidences of congestion are not great. The author thinks that there is no foundation for the popular opinion that a child prematurely born will remain delicate and feeble through life. On the contrary, the simple fact of surviving under these unfavorable circumstances proves the inherent strength of its constitution.

In the *treatment*, therefore, of asthenic children, great care should be taken not to fatigue them or ex-

haust their power. The placental circulation should be maintained as long as practicable. After the ligature is applied to the cord, dry heat and moderate frictions should be made to the surface. Accumulations of mucus should be removed from the throat by means of a camel's-hair brush or small "mop." The child should be washed with the least possible fatigue. This is best accomplished by immersion in hot water, to which whiskey, wine, or some other alcoholic preparation has been added. The surface should be carefully dried, and heated napkins be repeatedly applied; the child not being placed on its back, but always on its side, so as to prevent, if possible, the accumulation of mucus about the glottis. All ordinary dressing should be abandoned; the child should be wrapped in flannels, placed upon a soft bed of cotton or wool, covered warmly, and additional heat be supplied by placing hot bricks or vessels filled with hot water around its little bed.

When too feeble to take the breast, nourishment should be administered in very small quantities and at frequent but regular intervals, by suction. A spoon should not be employed. The best nourishment is sugar and water, the mother's milk, (if it can be procured,) barley water, arrow-root water, occasionally with an admixture of cream from cow's milk. With a judicious and attentive nurse, many children may by these measures be preserved.

"*Asphyxia*."—This, at birth, is very analogous to the asphyxia of adults, both arising from imperfect or suspended respiration. It constitutes, therefore, a very different condition from that of *asthenia* or want of vital power. In *asphyxia*, the child at the commencement of labor is healthy, strong, and well developed; but, from accidents during labor, the respiratory function of the placenta may be interrupted, or, after delivery, ordinary respiration may be prevented. Hence, there are two sets of causes producing *asphyxia*, as—

First. *During labor*, the placental functions may be interrupted by long pressure on the cord or on the placenta; by premature detachment of the placenta; and also by great and continued pressure upon the head and body of the infant, retarding or preventing a proper circulation of blood between the child and placenta. Compression of the head may be sometimes so inordinate, especially when made by instruments, as to cause effusions, or even mechanical lesions, which, of course, greatly aggravate the symptoms of *asphyxia*, and often cause death.

Second. *After labor*, respiration may be impeded by the cord entwined around the neck of the child, and sometimes by its face being completely covered with the membranes of the ovum—the child is said to be "born

with a caul." Breathing may also be prevented by the face of the child being immersed in the blood or other discharges from the mother, or by being buried under the coverings of the mother or the bed. Not unfrequently, also, great accumulations of tenacious mucus occur in the nostrils, fauces, glottis, etc., which may cause suffocation.

There are two states of this affection which authors have regarded as entirely distinct, one being termed the *apoplectic condition* of new-born infants, the other *simple asphyxia*, *anæmia*, and even *syncope*. The author has always been of the opinion that these are but two different stages or degrees of the same affection, and he is happy to find himself supported by M. Cazeaux. Congestive asphyxia is the first or minor stage, while complete asphyxia is of a more serious character, and is often followed by death.

Congestive Asphyxia is seen, in some degree, in almost every child born after a tedious labor; the whole head seems swollen, the features turgid and of a dark bluish color. The same is true of the interior of the nostrils, of the mouth, etc., and occasionally of the neck and chest. In most instances, after a short period, respiration commences even vigorously, and all these phenomena of venous congestion rapidly disappear. If, however, the causes of delay have been greater and the placental functions been more interrupted, then the venous turgescence continues, sometimes with œdema, or even bloody infiltrations, especially in the eyelids, and even under the conjunctiva of the eye. The child makes but few attempts, if any, to respire; its muscles are inactive; the pulsations of the heart and of the cord are generally perceptible, although feeble. From this state it often recovers; occasionally even after the pulsation has ceased in the stump of the cord, and its tissues have collapsed.

Complete Asphyxia causes the child to appear dead, the surface pale, the features collapsed, the limbs quiet, a slight bluish tinge in the lips, tongue, etc. The only evidences of vitality are feeble pulsations in the cord and in the heart; sometimes even the former have ceased, and there is no indication of life but a fluttering pulsation in the cardiac region.

This state may occur in the child when its tissues are well developed, and when there was every evidence of vigor at the commencement of labor. This complete asphyxia, the pallid condition of the surface, has been termed "*anæmia*," from which it, however, entirely differs. There is no want of good blood in the child, as is often manifested in the course of a few minutes or a few hours, after respiration and circulation are properly established, when the child appears and is as well as if no accident had occurred.

That the two forms of asphyxia differ merely in degree is proved by the similar character of the phenomena presented, and by the similarity of their causes. The only difference is the turgescence of the venous vessels in the one case, and their emptiness in the other. In other words, in congestive asphyxia, the circulation in the capillary and external tissues has not been so completely suspended as in complete asphyxia, and hence, in the former, recoveries ensue more frequently than in the latter.

We object, also, to the use of the word "*apoplectic*," as applied to the first variety of asphyxia; there is not an active determination of blood to the head, but it is a passive congestion, as is observed in all cases of asphyxia.

The *treatment*, in both forms of asphyxia, is precisely the same, with one exception: in the congestive form, where some activity remains in the circulation, and where the brain and heart are oppressed with a quantity of venous blood, experience proves that it will be advantageous to allow the vessels of the cord to bleed to the extent of half an ounce, or more, after birth. For this purpose, the cord may be divided without the previous application of the ligature; or, what would probably be better, is to divide simply the umbilical vein, so as to allow the blood to go to the placenta by the arteries, but to prevent its return by the vein; the depletion would be more indirect.

In the treatment of asphyxia, the first indication is to detect, if possible, any cause still operating, and to remove it. Hence, as soon as an infant is born, the umbilical cord, if entwined around the neck of the child, should be loosened and removed. The infant should be placed at some little distance from the mother, and care be taken that its face is not immersed in the liquor amnii, or the blood from the parent; and, also, that the coverings of the bed of the mother, etc., are not over the face of the infant. Should the membranes of the ovum be over the mouth and nostrils, they should be instantaneously removed: and, finally, where tenacious mucus accumulates in the fauces, its discharge must be facilitated; if the quantity be moderate, and the child not greatly suffering, it will often disappear by promoting deglutition. Generally, however, the finger of the practitioner, either alone, or covered by a rag, must be introduced into the fauces, to hook out the tenacious matter. A camel's-hair brush or small mop may occasionally be useful.

The position of the child is important: it should never be placed upon its back, but always on one side, frequently alternating from the right to the left. Dr. Dewees thinks an advantage would be gained by elevating the hips, above the level of the head; certainly,

in some instances, the child's head may be thrown forward with advantage, and supported by the hand of the practitioner on the chest.

The causes operating during labor, are very little under our control. Occasionally the umbilical cord may be pushed from one part of the pelvis to another where there is less pressure; or, if it be prolapsed, it may sometimes be replaced. The important indication, however, whenever the tediousness of labor or the weakness of the cardiac pulsations should excite the suspicion of asphyxia, is to hasten the progress of delivery, which may be done by the various medical and surgical measures hereafter to be detailed. The forceps, for example, have preserved many children who would otherwise have perished. They must often be employed for the sake of the child, even when the mother's condition will not render them absolutely necessary.

The next indication is to excite the respiration. The muscles of respiration must be excited by every direct and indirect method, while atmospheric air must be freely applied to the surface, and, as far as practicable, into the respiratory passages. Experience has taught that much can thus be accomplished.

No practice, we think, is more efficient than immediately to immerse the body of the child in water at a high temperature; at the same time allowing the circulation to continue in the cord until it spontaneously ceases. Dr. Dewees prefers dry heat; but the advantage of the *hot bath* is greater, as it is always at command, and can be more equally applied over the whole surface; and the sudden impression of the heat is very efficient in rousing up the sensibilities of the skin and nerves, and thus exciting muscular action. It doubtless also is useful, if there be any circulation remaining in the capillary tissue, by augmenting the determination of blood to the exterior, and thus relieving congestions.

Great advantage is also derived by the *sprinkling of cold water* on the face or chest of the child, or, what we prefer, elevating the thorax for a moment out of the hot water, and pouring cold spirits on the breast, and then immersing it, repeating the operation frequently. We thus derive the advantage from the shock given to the nervous system by the impression of cold, without experiencing any of its sedative influences upon the circulation. Very often a sudden inspiration or sigh will be excited by the application of the douche, indicative of the resuscitation of the infant.

After circulation in the cord has ceased, a ligature been applied, and the warm bath has had its trial, the child should be moved toward the fire, and be enveloped in warm napkins frequently changed, in order to excite

still further the circulation and muscular action. *Frictions* over the whole surface of the body will be advantageous, with dry and rough woollen cloths. Such frictions may be made over the spine, sides of the thorax, and the axilla.

The respiration may also be excited by *volatile articles* applied to the nostrils, or to the mouth, which will often prove very useful if any effort at inspiration be previously made. Some practitioners have recommended gentle *traction on the umbilical cord*, so as to cause a descent of the liver and diaphragm. All such traction must be very inefficient, and certainly by no means free from danger. We have found it more advantageous to embrace the whole front and sides of the thorax with the hand, and thus *compress the chest* for an instant; on removing the pressure the thorax will be dilated by the elasticity of its tissues, and thus its contraction and enlargement in the natural process will be imitated, while, at the same time, the muscles of the chest will be stimulated to action.

Experiments have also been made by means of *galvanism*, but not, as M. Cazeaux observes, with much success. Authors have thought also that warm stimulating enemata might be useful.

Much confidence has been placed in the various modes suggested of *inflating the lungs*. Dr. Dewees prefers the practice of closing the nostrils, and blowing into the mouth and throat of the child, either directly by the mouth of the practitioner, or by short tubes or canulæ. And others speak with great confidence of its success; but it will be generally found that the air passes not into the trachea of the child, but along the œsophagus into the stomach, which often becomes distended. To obviate this difficulty it is recommended to throw the head of the child back, and to place a couple of fingers on the larynx, by which it may be pressed closely to the vertebræ, thus facilitating the elevation of the epiglottis, and causing the closure of the œsophagus. A still more efficient suggestion has been made to employ a curved blow-pipe or tracheal tube, the small and bent extremity of which is to be carefully passed underneath the epiglottis, and then through the rima glottidis. This, however, although not easily accomplished, will insure the access of air to the lungs.

We acknowledge a want of faith in the success of all these processes of artificial inflation, especially as the air generally thrown in is not pure, but that already deoxygenated in the lungs of the practitioner.

It has been contended, also, that such inflations are positively injurious; and experiments have been made indicating the possibility of rupturing the delicate air-cells of the lungs. M. Depaul, however, denies, by

reason of more recent and careful investigations, that any such danger exists.

All these efforts to resuscitate an asphyxiated infant should be persevered in for a long time. Hopes should not be abandoned as long as the smallest evidence of vitality remains. Infants apparently dead, and making no effort to inspire for half an hour, an hour, and even longer, have been recovered. The first indication is a feeble sigh, or slight inspiration, which may not be repeated for some minutes. Then it returns, and becomes more frequent, until respiration is completely established. As respiration improves, the action of the heart, the large arteries, and eventually the capillaries increases. The skin loses its pallid color, and soon becomes turgid with red blood. The "cry" of the infant is decided, and indicative of the establishment of its natural sensations.

The child should not be regarded as feeble; once breathing, its vital powers are manifested in all their integrity. It should be well washed, and afterward rubbed with coarse napkins, so as to maintain the sensibility and actions of the external tissues, and thus facilitate all its internal functions. Afterward, warmth, nourishment, and rest, as on ordinary occasions, are alone demanded.

Syncope.—In some rare instances children are born in a state of faintness, arising from the loss of blood, either directly or indirectly: *directly*, from lesions of the umbilical vessels in the placenta, or of the umbilical cord, and still more rarely from internal effusions of blood; *indirectly*, long continued hemorrhages from the mother, or partial separation of the placenta from the uterus may also exhaust the infant. This state differs from common cases of asthenia, chiefly in there being an entire absence of congestion, as the respiratory process is generally established, and as the child is usually well developed. Nevertheless, its vital powers are very feeble, and complete exhaustion may ensue.

In this case all fatigue should be avoided; the body should be kept warm by dry heat, and nourishment with stimulants should be exhibited at short intervals, and in small quantities at a time.

Tumor of the Scalp.—This is also often termed *caput succedaneum*. This swelling is observed after tedious labors, and hence more frequently in primiparous women. The tumor always forms on that part of the head which is opposed either to the os uteri or os vaginæ; and hence, although called tumor of the scalp, is observed on the face in most cases of facial presentations. The nature of this tumor is evident, consisting of either serous or sanguineous effusions underneath the skin and other tissues of the scalp, and occasionally even under the periosteum. It is caused by the great

pressure of the walls of the uterus, or those of the vagina, on all portions of the head, excepting those opposed to the orifices of the uterus and vagina, where there is comparatively less pressure. Hence, the venous circulation in the scalp is interrupted, congestion in the blood-vessels of the exposed scalp first ensues, and afterward is followed by the effusion of serum or blood; precisely as when a ligature is tied around an arm, venous congestion and extravasation would ensue. In ordinary vertex presentations, if delay be at the os uteri, the swelling is usually over the sagittal suture: if the delay be at the lower part of the pelvis, in the first position of the vertex, the tumor will appear over the posterior superior angle of the *right* parietal bone: if, however, it be a second position of the vertex, it will be over the same angle of the *left* parietal bone. Hence, the location of this tumor varies with the different presentations and positions of the head, and also with the particular period at which the delay occurs in the process of descent.

This swelling is often very small, hardly to be noticed by an ordinary observer. In other instances, it is very large, two or three inches in diameter, and hence, has been termed a *caput succedaneum*.

These ecchymoses are also occasionally found upon the nates in pelvic presentations, and upon the shoulder and thorax in presentations of the arm.

The *diagnosis* is generally very easy; a soft oedematous swelling, or sometimes a tumor slightly fluctuating, is detected; there is no pain, redness, or other signs of inflammation; and the skin is often discolored, being of a dark color, from the effusion of blood. This is remarkably the case when the effusion is observed upon the face; then the skin is of a dark purple, and great ecchymosis occurs, extending even under the conjunctiva of the eye.

The margins of these tumors are generally soft and ill-defined; but sometimes, probably when the effusion occurs under the periosteum, there is a sharp defined edge, suggesting the idea that there is an opening through the cranium, and that the tumor comes from within its cavity. Hence, such swellings have been confounded with protrusions of the dura mater, or even of the brain, constituting what is termed "*cephalæmatoma*," or "*hernia cerebri*." Such protrusions from the cavity of the cranium are reported, but certainly they are exceedingly rare. The author has never met with an example; but he has often noticed the well-marked defined edge of these bloody tumors, demanding careful investigation to prevent mistakes.

As a general rule, all such bloody infiltrations are dissipated with great rapidity after delivery; in a few days they can hardly be detected, owing to the diffu-

sion of the fluid in the areolar tissue, and its rapid absorption. When, however, large quantities are collected, and especially when the tumor is circumscribed, "absorption" is tedious. Weeks, and occasionally even months may elapse before its disappearance. This is more frequently the case, if the blood collected should coagulate, which does not often occur.

This termination by absorption is very common; occasionally, however, owing to injury sustained at the time of delivery, or by subsequent improper treatment, inflammation may be excited, followed, it may be, by resolution, but sometimes by suppuration, ulceration, or even gangrene. Often, therefore, it is very dangerous, and even fatal.

The *treatment* of such swellings should be founded on the facts just mentioned. Every source of irritation should be carefully removed; the nurse should be cautioned not to press or rub the tumor, and not to allow the child's head to rest upon it when asleep; and no cap should be worn.

Generally, no other treatment is desirable, excepting the free use of tepid water in the process of washing. Should, however, the tumor be disposed to remain longer than usual, cloths wet with cool water, or with alcoholic preparations, will be found useful.

Should any evidences of inflammation be apparent, such evaporating lotion should be constantly applied, assisted by washes made with alum, acetate of lead, etc.

If, however, suppuration be inevitable, warm poultices may be demanded to relieve pain, and to hasten the "pointing" of the abscess. Much discussion has existed as to the propriety of puncturing such bloody abscesses: some surgeons maintain that they should be left to the process of ulceration; others, that small and valvular openings should be made so as to allow the partial exit of the pus and blood, and to prevent the admission of atmospheric air, which, they say, would cause putrefaction in the blood, and thus greatly enhance the dangers of the case; while others, again, recommend free incisions, so as to cause the immediate escape, if possible, of all the contents of the cyst, or, at least, so far to diminish the quantity of fluid that no subsequent mischief may result from its decomposition. This last plan seems to us decidedly the best, as removing all the various sources of irritation arising from distension, inflammation, etc., and as allowing every opportunity for the contraction and obliteration of the whole cavity of the abscess.

General treatment may often be demanded, especially the use of laxatives, warm baths, and anodynes; and, when the strength begins to fail, tonics and stimulants.

Hernia Umbilicalis.—The natural disposition of the umbilical opening to contract, in early infancy, is not unfrequently prevented. Should it remain patulous, the intestines often protrude, constituting umbilical hernia.

The umbilical orifice is occasionally, from a want of proper development of the walls of the abdomen, unusually large at birth. It should be remembered that, during the early stages of gestation, the abdominal parietes have hardly an existence, the viscera being covered by the membranes of the cord. By the third month, however, the viscera are enclosed by the formation of the muscular and other tissues of the abdomen. Occasionally, this is imperfectly accomplished at the umbilicus, even at the full period of gestation. Hence, the intestines may be found protruding, covered merely by the chorion and amnion of the cord. This is termed "congenital hernia," and is very rare.

Umbilical hernia is usually the result of distension of the alimentary canal; the child suffers, for example, very much from indigestion, and consequent development of gaseous fluids, causing great distension of the abdomen. The umbilical opening, instead of contracting, gradually yields to the pressure of the intestines, enhanced by the violent crying of the infant; the depression of the umbilicus disappears, the skin becomes prominent, and soon a portion of the intestine can be recognized passing through the enlarged orifice. The usual characters of hernia are now evident, the covering being formed of the cutaneous tissue, fascia, and peritoneum, instead of the membranes of the cord. It is very universally "reducible," but may, of course, become "strangulated," involving seriously the safety of the child.

Among the causes of umbilical hernia ought, perhaps, to be mentioned the "Binder" usually applied to the body of the new-born infant. Nurses, under various pretences, often apply it so tightly as to compress the intestines and, of course, force them violently against the natural openings of the umbilicus and groin. We believe this is not an unfrequent cause of hernia.

The *treatment* is very simple. All pressure from bandages or the dress should be carefully removed. The greatest attention should be paid to the diet of the infant, that it should be suitable and easy of digestion. If tympanites be present, the use of laxatives, carminatives, and occasionally even of anodynes, are all-important, assisted by warm baths, and also by oleaginous frictions to the abdomen.

After the hernia has been reduced by the taxis, its return should be prevented by suitable mechanical arrangements. Numerous "trusses" have been proposed,

which, although very ingenious, yet, in practice, seldom prove efficient. The chief difficulty arises from their slipping; the pad usually gliding upward from the convexity of the umbilical region. We have always succeeded on the plan recommended by Professor James, which consists in placing a thick and firm compress, narrow in proportion to its length, over the umbilical orifice, and between the recti muscles. This compress is to be secured by a strip of adhesive plaster two inches wide, and long enough to extend to the loins on either side. It should be drawn quite firmly, one extremity being made to adhere before the other is applied. The advantages of this mode are, that the compression is steadily maintained, thus preventing protrusion of the intestine, and facilitating the natural disposition of the ring to contract; while, at the same time, no resistance is made to the distension of the abdomen from the accumulation of gas, fæces, etc. The adhesive plaster seldom proves irritating to the skin, but may stretch, and become loosened, owing to perspiration, etc. It must, therefore, be renewed every three or four days. The application of "colloidion" and "Donna Maria gauze," now much used by the surgeons, might obviate these objections.

A radical cure may thus be expected in the course

of a few weeks or months, if proper attention be paid to prevent the occasional return of the hernia.

The plan proposed by M. Dupuytren, of returning the intestine, and then tying a ligature around the skin at the umbilicus, promises very little, with or without the assistance of "hare-lip pins." It does not act on the tendinous opening in the linea alba, and also is a very severe and dangerous operation; many children having died after its performance.

Umbilical hernia may occasionally be irreducible, in which case, the symptoms can merely be palliated. Should it, however, be "strangulated," a surgical operation would be usually required.

"*Inguinal*" or "*Femoral Hernia*," is also sometimes met with. Inguinal hernia is far more frequent, and occasionally congenital; in which case, the intestine usually descends into the sac of the tunica vaginalis testis. Should, however, the intestine descend after birth, it has an independent sac of peritoneum, as in ordinary cases of hernia. These herniæ in infants must be treated by "trusses," as in adults, the parts being frequently bathed with cold water. A radical cure may be expected, if the intestine be kept constantly reduced; but more time is required than in cases of umbilical hernia.

CHAPTER XII.

OBSTETRIC OPERATIONS.—MANUAL MEASURES.

HAVING now described the natural modes of delivery, and the best means of facilitating all the important functions, both general and local, called into requisition in this important process, we should notice the numerous sources of delay and danger to the child and its parent which may possibly occur. Providentially, a very large proportion of labors are perfectly normal, or, at any rate, the deviations are so unimportant, that after some delay and increased suffering, parturition is accomplished with safety to the mother and her child. This general fact is so well established, that many have contended that the science and practice of obstetrics may be safely abandoned. This extreme notion has been negatived positively by dire experience in all ages of the world, and in all classes and states of society,

more especially as civilization advances, and the mental and moral being obtains a paramount influence in the animal economy; the susceptibilities of the animal system increasing, and its powers lessening, as the mental and spiritual faculties are cultivated.

However numerous may be the exceptions to these general truths, there can be no doubt of their correctness, and that there is, therefore, no department of the medical profession of more importance, or which confers more numerous and substantial blessings on society, than the science of obstetrics.

We have already insisted on the great advantages resulting from what we term the negative practice of the accoucheur, valuable in every case of labor, normal as well as abnormal. Positive assistance often,

however, is demanded, not merely when the life of the mother or her child is involved, but in the far greater number of cases where the complications are not dangerous, but still so decided as to render parturition tedious and difficult, prolonging the mental and physical agonies of the suffering mother, and laying the foundation of subsequent debility and impaired health to the mother or even to her infant. We never could believe in the scientific skill or humanity of that obstetrician who, satisfied with the idea that a woman can deliver herself, remains a quiescent spectator of the prolonged agonies of a refined delicate woman, when a little judicious attention and scientific assistance could mitigate her sufferings and shorten their duration. If "meddlesome midwifery" be bad, surely negative midwifery deserves no less reprobation, especially as it involves not merely the prolonged suffering of the mother, but, in a large number of cases, her life and that of her infant. Scientific assistance, therefore, in all cases of complication of labor, small or great, is the imperative duty of the practitioner. As he cannot escape this responsibility, let him be carefully prepared for any and every emergency, so that, while he should never ignorantly or unnecessarily disturb the natural functions, he should, on the other hand, be ready to facilitate their operation, and, on suitable occasions, to interfere positively and decidedly for the salvation either of the mother or her infant.

Before entering, however, on the subject of dystocia, or complicated labor, we will consider those measures at our command for alleviating or completely removing the difficulties and dangers of such complications.

These measures may be properly considered under two general divisions—Medical and Surgical.

MEDICAL MEASURES.

There are numerous complications of labor arising from physiological or pathological conditions of the general system, or of particular organs, which demand all that variety of treatment usually termed *medical*, in contradistinction to all those manipulations, with or without the assistance of instruments, termed *Chirurgical*. Hence, venesection, cathartics, diaphoretics, and other evacuating remedies, also, opium, ether, and every other description of anti-spasmodic, anodyne and narcotic medicines, and, in many instances, alteratives, tonics, and stimulants are called in requisition under the ever varying circumstances connected with complicated labor. Their appropriate application and the complications demanding their employment constitute Medical Obstetrics. Special directions for the suitable administration of these remedial agents can

therefore be properly detailed only when such physiological and pathological cases of dystocia are under consideration.

At present we shall give some general account of the surgical operations demanded in obstetrics, leaving specifications of the particular circumstances under which such operations become necessary until the examination of what may be termed the mechanical complications of labor.

SURGICAL MEASURES.

Chirurgical or *Surgical Measures* may be subdivided into two heads: First, those in which the hand alone is employed, and, second, those in which the hand must be armed with instruments. These have been usually distinguished by the expressions *Manual* and *Instrumental Labor*. It is well, however, to remark that by these words the idea should not be conveyed that the character of the labor is necessarily altered, because the hand or an instrument is brought into requisition. The character or nature of the difficulty may be precisely the same in a given case, whether the hand or an instrument be employed; for this often depends upon the choice or convenience of the practitioner, who, at one time, may render assistance by the hand, and at another by the instrument; or, perhaps, he may avoid both, and trust to medical measures, or allow the labor to terminate without assistance. Even when surgical assistance is absolutely necessary, one practitioner may deliver in one mode, while his brother in the profession, equally skilled, may prefer another. To one, therefore, it will be a manual and to the other an instrumental labor; the character, however, of the process being precisely the same. Still there are many cases when medical and manual means are altogether inadequate, and delivery by instruments can alone preserve the mother or her child.

OPERATIONS BY THE HAND.—Under this expression may be included all those minor operations, such as facilitating flexion, rotation, extension, etc., which can readily be accomplished simply by the fingers of the practitioner, or by a slight external pressure by the hand. Thus, even by the fingers alone, some of the presentations may be corrected, and the labor originally difficult and tedious can be rendered easy. Generally, however, manual labor implies an introduction of the hand into the vagina or uterus, so that a decided change can be effected in the presentation of the fetus, and an additional power be applied to effect delivery.

Both these objects are usually included under the word "*Version*," by which is meant the altering of an

unfavorable into a favorable presentation, especially by changing the posture of a child in utero so that one or the other extremity of the foetal ellipse shall be brought to the centre of the pelvis, and then rendering any additional assistance that may be demanded. Usually, therefore, the object of version is to induce a vertical or coccygeal presentation as a substitute for a malpresentation. To this there are one or two exceptions, to be hereafter noticed.

We speak, therefore, of *version by the vertex*, and of *version by the pelvis*, which last includes what is usually termed version by the feet. We prefer decidedly the expression Vertical to that of Cephalic Version, not simply from the fact that the vertex or region of the posterior fontanel is the true extremity of the foetal ellipse, but also because it should always, if practicable, be brought to the centre of the pelvis; for if, by the operation of version the sinciput, the forehead, side of the head, or even the face should be made to descend, the presentation is unfavorable, and, technically, unnatural, as compared with vertex presentation.

The operation of Version, whether by the vertex or pelvis, is necessarily painful to the mother, and may endanger her welfare and that of her infant. It should never be thoughtlessly undertaken.

The First Rule of the practitioner is carefully to examine the true character of a complication, its difficulties and dangers, and compare them with those necessarily connected with a manual operation. If he should be inexperienced, or any doubt should exist, consultation with a medical friend will not merely assist his judgment, but also protect his reputation in case of an unfortunate result. Here, as in all surgical operations, whatever may be the difficulties, the lesser should be preferred to the greater evil; and the practitioner should not shrink from the operation of version even in the most desperate cases, where, after judicious investigation, it presents the best, and it may be the only hope for the patient or her child.

The Second Rule, connected with the former, is always, before undertaking its performance, to apprise some judicious relative, friend, or attendant, of the necessity and character of the operation, and of any doubt which may exist as to its success. Frequently, also, information more or less complete should be given to the patient herself, to prevent any unnecessary alarm or apprehension.

The Third Rule is, that Version is not to be performed during the first stage of labor, but be restricted to the second stage, or more strictly, if possible, to the interval between the first and second stages; in other words, the operation is to be delayed until the os uteri is fully dilated, or at least dilatable, and it should not be

performed after the presenting part has passed the circle of the os uteri. The reasons for this rule are evident; for if the operation be undertaken before the os uteri be dilated, the introduction of the hand into the uterus would produce great suffering, increased irritation, with danger of contusion and laceration of the cervix, and of course lay the foundation of inflammation, and other serious consequences, involving the comfort or safety of the mother; while to the child the dangers also will be exceedingly aggravated, or even fatal. After the version is accomplished, the foetus will have to be drawn through the contracted orifice, causing pressure upon the umbilical cord, or serious delay from the arrest of the shoulders or head during the forced descent; while the passage of the shoulders and head would increase the contusion or laceration of the neck of the uterus, which might have been previously induced by the hand of the practitioner.

Although we have no doubt of the correctness of the rule now laid down, yet it is manifest that the practitioner must be governed by the peculiarities and urgency in the case under his care. The complication may be so severe and so dangerous to the mother, that the operation may be justifiable, long before the os uteri is fully dilated, in order to afford a chance for the mother's preservation. Hence the word "dilatable," or "easy to be dilated," must be regarded as representing the condition of the os uteri in the various instances justifying the operation.

We are not prepared, however, from anything we have met with in practice, to resort to what has been termed "forcible dilatation" by the hand, or even by the knife, in cases of contracted or rigid os uteri, not complicated with organic alteration of the tissue. English and Continental accoucheurs, who, perhaps, resort to version more frequently than is done in America, are continually recommending dilatation of the os uteri in cases where it is rigid and unyielding, and especially where it is already enlarged to the size of a "crown piece," by the introduction of one or two fingers, and slowly of the rest of the fingers and hand, steadily operating during the absence of a pain. Many of the French practitioners, would, if there be much resistance, make "multiple incisions" on the inner surface of the os, believing that there would be less danger of contusion and laceration than if the enlargement was accomplished by the hand alone. With all deference to these high authorities we cannot fully endorse this advice. The combined dangers to the mother and child, as has been above stated, seem to us usually to forbid all such forcible interference with the natural progress of labor: the dangers to both parties will be

lessened by temporizing, until the os uteri be *dilatable*; and in cases of rigidity by facilitating the natural disposition to relaxation by venesection, opiates, anæsthetics, etc. The cases specially referred to by our European brethren are those of uterine hemorrhage, or puerperal convulsions. We shall hereafter, when speaking of these complications, present our reasons for objecting to the common practice of employing version in such instances. We must believe that the patient, and very generally the child, will be safer by adopting other modes of delivery.

The Fourth Rule is, that version is not to be attempted when the presenting part is beyond the verge of the os uteri. This rule is founded not simply upon the fact, as has been maintained, that the os uteri is then so firmly contracted around the face, neck, or body of the child, that it cannot, without danger, be still further dilated by the hand of the practitioner; but mainly because the whole body of the uterus is now diminished in size, and there is no room for the restoration of any part which has once escaped, and the attempt to push it back would endanger a rupture of the vagina, and even of the uterus itself.

The Fifth Rule, therefore, is to operate, if possible, before the membranes are ruptured, or as soon after as possible, while the child is movable, and the uterus imperfectly contracted. If the membranes be not ruptured, it has been advised to pass the fingers exterior to the membranes for some distance—unless the placenta be met with—before evacuating the liquor amnii; by thus rupturing the membranes high up, the amniotic fluid will not so readily escape, and the “mutation” of the child can therefore be more readily effected. Under these circumstances the operation is comparatively easy for the practitioner and safe to the mother and child. It becomes more difficult of execution, more painful to the patient, and more dangerous to the child and its parent in proportion to the delay and the subsequent contractions of the uterine fibres; and hence, sometimes from these powerful and persistent contractions, it becomes absolutely impracticable.

The Sixth Rule is, that, when such powerful contractions exist, measures should be employed to diminish or even to suspend their influence before the operation be undertaken. The practitioner should be careful to remove every additional source of irritation arising from mental or physical causes, especially from the condition of the stomach, bowels, rectum, etc., and then employ means addressed to the vascular and nervous systems, so as to favor directly or indirectly the relaxation of the uterine tissues.

In many such cases, Dr. Dewees would recommend bleeding the patient freely, while in the sitting or erect

posture, even to faintness, and then resorting to the operation. This, however, cannot always be employed, owing to the existing debility or exhaustion of the patient. Advantage, however, will be often procured by the use of a general or local warm bath, warm fomentations, warm vaginal or rectal enemata, warm drinks, diaphoretics, including ipecacuanha, tartar emetic, etc. The most effectual means, however, with or without these previous evacuations, are afforded by remedies addressed to the nervous system, so as to quiet the greatly excited nervous and muscular actions of the uterus. Any of the narcotics may be applicable, but, until lately, nothing was comparable to the preparations of opium in these emergencies. After the use of evacnants, a strong dose of laudanum should be administered, generally best by the rectum, and, if necessary, repeated until its narcotic influences be perceptible, when such relaxation of the uterine fibres will often ensue that the operation may be safely conducted.

Of late, we have a still more powerful agent in the free exhibition by inhalation of ether or chloroform. After the introduction of anæsthesia to alleviate suffering in surgical operations, Professor Simpson, of Edinburgh, fortunately suggested its use in labor; and however unnecessarily or inconsiderately the practice of inhalation may have been resorted to, there can be no doubt of its occasional beneficial influences. Perhaps in no case is it of more real importance than in the present, when we desire not simply to relieve severe suffering, but to suspend also contractions of the abdominal muscles and diaphragm, and, if practicable, those of the uterus. On this occasion, therefore, anæsthesia may be carried to the state of complete insensibility, and continued until version has been effected; but it should be allowed to pass off as soon as possible, after this object is accomplished, so that the contractions of the uterus and those of the abdominal muscles and diaphragm may be re-established in order to accomplish the descent of the child under its now rectified presentation.

The position of the woman, the operation being determined upon, is a matter of importance. Very universally, in all operative midwifery, the supine posture is decidedly preferable, and is most usually recommended, especially by the French, German, and other Continental, and also by most American accoucheurs. The chief advantage arises from the fact that the practitioner may readily unite external with internal manipulation; while operating with the one hand in the cavity of the uterus, with the other he can, without difficulty, co-operate by external pressure upon the uterus through the parietes of the abdomen. If the

patient be upon her side, this can be accomplished only imperfectly, if it be not indeed impracticable. This co-operation is very important, and cannot advantageously be committed to an assistant. Another advantage of the position on the back is, that the pelvis is comparatively fixed, the agitations of the patient not altering its relative direction with the bed; while upon the side the degree of inclination often varies exceedingly, necessarily rendering it more difficult for the practitioner to bear in mind the relative position of the child with the different portions of the pelvis during the operation. It is also generally true that the patient complains less of the position on the back; her limbs also will be more readily separated, and in every way she can be better assisted and supported by the attendants.

The shoulders and head should be well elevated with pillows, and the hips be brought to the edge of the mattress, especially when it is requisite to pass the hand far into the uterus; and the limbs of the patient should be supported by chairs or tables, according to the height of the bedstead, or by means of assistants. Sometimes it may be advantageous to commence the operation of version with the patient upon her left side, as the arm then can be more readily passed in the direction of the axis of the uterus, and, if requisite, she can at any time be turned upon her back. English practitioners very universally recommend the lateral position, and direct that the feet should be placed against the bedpost, the thighs strongly flexed against the abdomen, and the nates brought down to the margin of the mattress; and also that the knees should be kept widely separated by the hands of an intelligent assistant.

The position of the accoucheur, when the patient is supine, is to sit, kneel, or even stand between her lower extremities, according to the stage of the operation, as well as the height of the bedstead, while he takes care, from feelings of delicacy, that the patient be completely covered, as no exposure is requisite. No other preparations are necessary for the operation than an abundance of lard, oil, or mucilage for the comfort of the patient, and the usual provision of hot water, alcoholic fluids, and other means, suitable for the restoration of the infant, if born asphyxiated. It seems almost unnecessary to suggest that suitable protection for purposes of cleanliness should be given to the edges of the mattress, and also to the floor, carpet, etc., which may be injured by the discharges from the patient; and that the practitioner should avoid all unnecessary parade or solicitude as to his own dress or person, although the arm must be sufficiently bared for its introduction within the uterus.

It may be proper to add that when the religious feelings of the parent or her friends are involved, they should be indulged without hesitation, as regards the baptism of the infant, prior to undertaking an operation in which its life may be concerned.

Version by the Vertex.—This has been usually termed cephalic version. It is a very ancient operation, which fell much into disuse after the introduction of version by the feet. But toward the close of the last century, Flamand, Osiander, and others, recognizing the great mortality to infants in podalic version, revived the ancient practice of bringing the head rather than the pelvis to the orifice of the uterus, in cases of mal-presentation.

If this object could be readily accomplished, few, if any, would doubt its superiority, as many children perish in pelvic deliveries, and comparatively very few in vertical presentations.

The chief objections, which have been urged against it, are,

First. The difficulty of execution, and

Second. After "mutation" has been accomplished no extractive effort can be made by the hand.

This latter objection ought not to be regarded as of any importance, inasmuch as the operation is performed simply for *mal-presentations*. The presentation being corrected, so that the vertex presents, the uterine powers are as fully adequate to effect delivery as in natural labors. Even if there be any other complication, such as inertia of the uterus, extractive force can be applied by means of the forceps, with far more safety to the child, than if the feet were brought down, and traction made by means of the body and neck.

We cannot but regard this observation as true, even in cases of moderately contracted pelvis, notwithstanding the high authority of Professor Simpson, and the weight given to his opinion by M. Cazeaux. This question, however, will be considered at length under the head of "Labor Complicated with Deformed Pelvis."

Dr. Wright, of Cincinnati, in a prize essay, has strongly urged the recourse to cephalic version in various mal-presentations, even of the shoulder, where descent of the arm has taken place; and his paper has had considerable influence with some American practitioners.

Professor A. Mattei, of Corsica, recommends very strongly cephalic in preference to podalic version, and deems it so practicable that he imagines that it will, eventually, supersede turning by the feet.

Under certain restrictions, the author has, for some thirty years, taught that version by the vertex should be resorted to in deviations of the upper part of the fetal ellipse.

The other objection proposed is the difficulty of execution. In favorable cases we have not found it so; indeed, it is an operation very generally as practicable as podalic version; for the hand of the practitioner need not be introduced far into the uterus, and it is easier to find the head than the feet, the fingers being passed over the occiput, and retained with sufficient firmness to make the requisite change in the presentation. It is true, however, that if the operation be long delayed until the uterus is powerfully contracted, and especially until the presenting part has partially escaped from the os uteri, this mode of operating would be difficult, painful, and often impracticable: but the same is true, if version by the feet be attempted under similar circumstances. We must, therefore, come to the conclusion that version by the vertex is always desirable, because there is a greater prospect of preserving the life of the child. It can be usually performed as easily as podalic version, and the sufferings and dangers of the mother, instead of being aggravated, are lessened, as compared to the operation of turning by the feet. It is also a recommendation that if, from any cause, it should be found impossible to bring down the vertex, the practitioner could, without any important loss of time, resort to podalic version.

The restrictions to which this operation should be subjected are not dubious; it should be confined to mal-presentations of the upper extremity of the foetal ellipse. This includes, therefore, all mal-presentations of the head, such as the forehead, face, etc., also presentations of the anterior and posterior parts of the neck, and many cases of the shoulder, especially where the arm has been retained in the uterus; although Dr. Wright speaks of his success in returning a descended arm, and then effecting version by the vertex.

It should seldom be thought of in presentations of the sides of the trunk, or any of the deviated presentations of the pelvic extremity.

Again, it ought not, often, to be attempted, except during the early period of the second stage of labor before or immediately after the membranes have ruptured; before, therefore, the uterus is powerfully contracted, and while the child is still movable. The experienced and judicious practitioner may sometimes succeed, even when powerful contractions have ensued, and the child been greatly compressed; but, in such cases, success is not usually to be anticipated, and the dangers to mother and child are measurably increased.

We shall defer many details incident to the peculiar complications which may necessitate version, as they will pass in review under the head of Dystocia.

The operation being determined upon, the *choice of a hand* to be employed in version by the vertex is of

importance. This might be left to the decision of a judicious practitioner, at the time of operating. He knows the mal-presentation, how it is to be rectified, and should have no difficulty in determining with what hand, and in what manner, he could most easily and efficiently execute his purpose. Still, it is a very convenient and excellent rule for the practitioner, when fronting his patient, to choose that hand which corresponds to the side of the patient where the deviated occiput is to be found. Thus, when the occipital extremity of the head is in the left iliac fossa, the right hand will be the most convenient; if in the right iliac fossa, the left hand should be used.

For purpose of illustration, we shall now suppose a presentation of the left side of the head or neck in the left occipito-iliac position, (Plate XXVIII., Fig. 139,) the occiput inclining to the left iliac fossa. All previous arrangements having been made, and the diagnosis carefully established, the practitioner should freely anoint the orifice of the vagina, the whole pudendum, also the back of his right hand, and a large portion of the fore-arm. The palm of the hand should be left free from the ointment, as the fingers then can grasp more firmly the head of the child. The first step of the operation is to enter the vagina. This should be accomplished by the fingers of the hand separating the labia, and then arranged in a conical form and in a state of semi-pronation, so that the radial side of the index finger shall be toward the pubis, and the ulnar side of the little finger toward the posterior commissure of the vulva. The fingers should be directed perpendicularly to the orifice of the vagina, corresponding, therefore, to its axis, and pointing toward the lower part of the sacrum, but not in the direction of the axis of the inferior strait, as has been often recommended. Care should be taken, during the introduction, not to press firmly against the urethra and other delicate tissues at the arch of the pubis, especially as no dilatation of the opening can be effected in that direction; but the pressure should be made posteriorly, where the orifice readily enlarges. Such pressure, also, should be made "during a pain," as it necessarily excites some additional suffering, which the patient is then less apt to notice, and as the bearing-down effort really facilitates the introduction of the hand.

The hand should be thus carried slowly in the direction of the axis of the vagina, until the knuckles have passed the external orifice, when it should be gradually turned into a state of supination, so that the back of the hand will be toward the perineum, and the points of the fingers toward the presenting part of the child and in the direction of the axis of the superior strait of the pelvis. The best rule, then, is to open

the hand, and carry the fingers toward the posterior part of the pelvis, and the thumb toward the anterior portion. The fingers, therefore, should always be sacral and the thumb pubic; although, very generally, the hand is somewhat oblique, as, for example, in the present case, the fingers toward the left sacro-iliac symphysis, and the thumb toward the right acetabulum. This, we think, is a more simple rule, and one easier to be remembered, than that the fingers should be directed to different portions of the child, as they must be continually varying in different presentations and positions.

In this position of the left side of the head, the fingers should be carefully insinuated through the os uteri, and placed toward the back of the neck, while the thumb should be carried toward the face of the child *during the absence of a pain*, when the os uteri will afford the least resistance; in this way, the palm of the hand will be brought in contact with the side of the head or presenting part. The practitioner should now wait for a suspension of the expulsive efforts, and then push the whole head and body directly upward in the direction of the axis of the uterus, and, at the same time, carry the presenting part to the side of the pelvis opposite to that occupied by the occiput: in this case, therefore, toward the right iliac fossa. This important manœuvre can be greatly facilitated by the application of the left hand of the practitioner on the right and upper portion of the abdomen, and then pressing the fundus of the uterus from the right toward the left side, which, as the uterus is now firmly contracted upon the child, will give a corresponding direction to its pelvic extremity, and, of course, an opposite direction to the cephalic extremity of the fetal ellipse. This conjoined operation will bring the child's head toward the centre of the pelvis.

The fingers of the practitioner—still during the absence of a pain—are now to be carried carefully from the back of the neck over the left side of the occiput, and over the occipital protuberance, upon which traction effort can now be effectually made, so as to direct it downward, increasing the flexion of the head, and so as to facilitate a lateral rotation on its axis, thus determining the vertex toward the centre of the orifice of the uterus and that of the superior strait. The fingers should be retained in position until a powerful contraction of the uterus has occurred, so as to fix the head in its now rectified presentation; when the hand of the practitioner may be safely withdrawn. The “mutation” is thus accomplished; that is, the conversion of a presentation of the side of the head into one of the vertex.

A similar mode of operating, with slight deviations,

should be adopted in all cases where the occiput is toward the left side of the patient.

If, however, the occiput is upon the right side of the patient in any of the various mal-presentations of the superior portion of the fetal ellipse, the left hand should be employed in the pelvis and uterus; while the right hand should be applied to the upper and left portion of the abdomen, so that, by the conjoint action of both hands, the head of the fetus may be directed from the right toward the left iliac fossa, and thus facilitate the passage of the fingers of the practitioner over the occiput, in order to cause its descent.

Version being thus accomplished, delivery should be left to the natural powers, as in ordinary cases of normal labor. Should, however, there be any deficiency in power on the part of the patient, assistance may be rendered by the forceps, ergot, etc., according to rules to be detailed.

The proper appreciation of version by the vertex will more clearly appear when alluding to the various complications of labor in which it may be demanded. An opportunity, also, will then be taken to specify any peculiarities in the mode of operating suited to special occasions. We shall defer saying anything, at present, of effecting version by the head in cases of transverse presentations by means of external manipulations, now much employed, especially by German accoucheurs.

Pelvic version includes version by the *breech*, *knees*, or *feet*. The circumstances are few in which version by the breech or by the knees are demanded. Hence, pelvic version usually conveys the idea of the feet being brought down, constituting, therefore, podalic version, which is founded upon the fact that artificial delivery after mutation has been accomplished, will be demanded; and this can be made more readily and safely when the practitioner has command of the limbs and body of the child. If, however, this necessity did not exist, and nature is adequate to the delivery, version by the breech, if practicable, is preferable, as less dangerous to the child, and, occasionally, therefore, should be performed.

Version by the Feet.—When, however, from any complication—as hemorrhages, convulsions, etc.—the necessity occurs for immediate delivery, version by the feet, if the presenting part be still within the uterus, may be, and has been, generally employed. It may be questioned, however, as will hereafter appear, whether this be the better practice in most cases; or whether, to the experienced practitioner at least, the expulsion of the child cannot be effected more readily, with less suffering to the mother and with much greater safety to the child, and perhaps also with equal

rapidity, by means of the forceps. Version by the feet ought to be regarded as a dangerous operation for the foetus, although it may be often easily and safely performed.

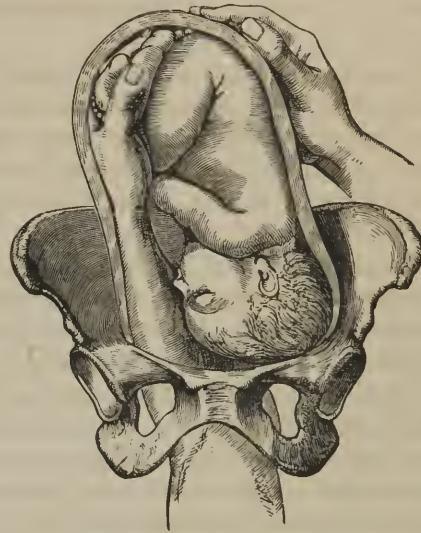
The propriety of version by the feet, being determined upon according to general rules for "turning" already given, and the patient being placed close to the edge of the bed, with the shoulders elevated, the hips protected from pressure, and the lower extremities well supported, the practitioner should again satisfy himself of the exact presentation and position of the foetus. For purpose of illustration, we shall suppose the *first* or the left occipito-anterior position of the vertex.

The *choice of the hand* is now the reverse of that necessary in versions by the vertex, inasmuch as the feet are to be found toward the anterior part of the body of the foetus. The best rule, therefore, is to choose, when the practitioner fronts his patient, that hand which, in a state of semi-pronation, has its palm corresponding to the front part of the child. In this first position, therefore, of the vertex, the left hand will be demanded. Many other rules have been proposed which need not be specified, as the one mentioned has comparatively few exceptions, and much, in all cases, must be left to the convenience and judgment of the operator.

The introduction of the hand through the orifice of the vagina into the pelvis in a state of semi-pronation, is effected in a manner precisely similar to that directed in version by the vertex. Then the hand in the pelvis is brought into a state of supination, and the fingers carried toward the sacral region, and in this position somewhat to the left, and the thumb toward the pubic region and to the right. The hand should carefully, during the *absence of a pain*, be introduced through the os uteri to the sides of the head of the child, the fingers now to the left, and the thumb to the right side of the head, the top of the head being thus brought into contact with the palm of the hand. During the absence of a pain, the whole head is to be directed upward in the axis of the uterus, so as to disengage it completely from the superior strait of the pelvis, and it should be immediately conveyed as far as practicable toward the left iliac fossa, so as to allow space for the transmission of the hand and arm of the physician. This manœuvre is to be facilitated by the right hand of the practitioner pressing upon the superior and left portion of the uterus, now firmly contracted on the body of the child, so as to give a right lateral inclination to the fundus of the uterus and, of course, also to the breech of the infant. This being accomplished, the thumb of the practitioner is conveyed around the fore-

head of the child to the left side of the head, and during the absence of a pain, the whole hand spread out should be carried along the left side of the child as a guide to the breech; if necessary, occasionally pausing during the uterine contractions, and then moving on when they are suspended. The fingers then, if possible, are to be passed over the sacral region of the breech to the posterior part of both thighs, to the knees, legs,

Fig. 36.



Version by the Feet.

and afterward to the heels; the practitioner being careful, as the hand glides on the posterior part of the extremities, gradually to insert the index finger between the legs of the foetus, so as to prevent any injurious pressure of one limb upon the other during the subsequent delivery. The limbs of the child are readily unfolded on its anterior surface, so that the feet now easily descend toward the lower part of the uterus, the practitioner having the heels in the palm of the hand, and the toes pointing to the front of the infant. This part of the operation is facilitated by the right hand of the practitioner maintaining a right lateral obliquity of the uterus, and at the same time depressing the fundus—acting, as far as practicable, only in the absence of pain.

When the uterus contracts powerfully, all this portion of the operation is exceedingly painful for the mother, and often dangerous, as contusion or even laceration may ensue. Great caution and tenderness, therefore, are demanded from the operator. The hand should be moved gently and slowly, during the absence of contraction, and should be carefully extended over the surface of the child during the expulsive efforts of the uterus, so that no projections shall be offered to the

uterine surface by the knuckles or other portions of the hand.

It is not always practicable to carry the hand over the sacrum and breech of the child; in many instances the anterior surface of the infant must be taken as a guide to reach the extremities, so that they may be brought down and mutation be thus accomplished.

It often happens that only one limb of the child can be reached, which is then to be brought down in a state of "adduction," and not of "abduction," as then dislocation of the limb might result, care, however, being always taken to bear in mind the relative position of the limbs. After bringing down one limb, it may be sometimes proper to secure its position by a noose passed over the foot to the ankle, and then the practitioner might use this limb as a guide on a subsequent introduction of the hand to discover and bring down its fellow.

Dr. Radford, of Manchester, has recommended that in all cases, one foot only should be brought down. His reasons for this advice are, first, that one limb being retained, a larger body passes through the os uteri, rendering the dilatation more complete, and thus facilitating a more ready descent of the shoulders and head—retaining, therefore, some of the advantages of an original breech presentation as compared with a footling case; and, second, he thinks that the retained limb will serve to protect the umbilical cord, in some degree, at least, from injurious pressure. We do not perceive much force in these reasons, and although it may be left to the convenience of the practitioner to bring down one or both limbs, yet it is more desirable to have both extremities at the command of the physician, as there is then no danger of injuring the limbs by any abduction, and a more complete command is obtained over the body of the child.

Dr. Breen, and others, have advised to bring down the knees instead of the feet, placing the fingers "in the ham" of one or both limbs. To this there can be no objection, if it prove to be more convenient; for the legs would soon unfold in the cavity of the pelvis, and traction effort can be readily made.

The practitioner may now wait, if necessary, for a pain, and then make traction on the limbs of the child in the axis of the superior strait—thus causing a descent of the breech, great flexion of the body, and, of course, its revolution in the cavity of the uterus and the necessary gradual ascent of the head from the lower and left side of the uterus toward the fundus, as the limbs and breech descend; in other words, by this manœuvre, a vertex is converted into a foot presentation; the head, formerly at the lower part of the uterus, is now at the fundus, and the limbs pro-

jecting from the vagina. If any difficulty should exist in the ascent of the head, it may be assisted by the thumb of the left hand of the practitioner pressed against the os frontis so as to push it upward while the breech descends, or one or two fingers of the right hand may be directed to the head so as to promote its ascension.

While drawing down the feet, care should be taken, in this first position of the vertex, to give a spiral motion to the body of the child, so that the posterior part of the limbs placed toward the right sacro-iliac symphysis, may be gradually brought toward the right

Fig. 37.



Version by the Feet.

acetabulum—in this way the child's feet are brought down, not in the fourth position, but in a second position. We thus escape the disadvantages of a sacro-posterior position, and gain all the advantages of an original sacro-anterior position of the pelvis. To effect this spiral turn of the body, traction should be made upon the limbs in an oblique direction from above downward, and from behind forward. It has been advised to make the traction effort with this object chiefly upon the anterior or pubic limb, for which we can discover no adequate reason.

In the *fifth position* of a vertex presentation, the operation for version by the feet is accomplished precisely in the same manner, with the single exception that traction effort upon the limbs should be made directly downward without giving any spiral motion to the body of the child; because in this case, when the head ascends, the feet will readily present in the second position.

In the *second position* of a vertex presentation the operation is virtually the same as in the first position, excepting, of course, that now the right hand of the practitioner is to be employed, as the feet are to the left side of the uterus; and during the operation the head is to be pushed toward the right iliac fossa so as to give space to the arm of the practitioner and the subsequent descent of the limbs on the left side of the pelvis; also, that the limbs should be drawn down obliquely, so as to give a spiral turn to the child's body, that the feet may descend in a first position, with the heels toward the left anterior inclined plane, and the toes toward the right posterior inclined plane; thus again procuring the advantage of a sacro-anterior position of the pelvis.

In the *fourth position* of a vertex presentation the same operation with the right hand is requisite, avoiding, however, any spiral turn to the body, as the simple, direct revolution of the child will bring the feet into the first position.

In the *third and sixth positions* of the vertex, should the operation of version by the feet be requisite in such cases, either the *right* or the *left* hand of the practitioner may be employed at his convenience, bearing in mind, however, that if the *right* be employed, the feet should be drawn down in an oblique direction, so as to make them descend in the first position; but if the *left* hand be employed, an opposite direction should be given to the spiral turn of the child, so as to make it descend in the second position of the feet.

This is the operation, therefore, by which mutation or version by the feet is accomplished.

If nature be adequate to the delivery, no further assistance should be offered, for reasons already specified; if, however, nature be inadequate, if there be no proper expulsive efforts, the descent of the child must be effected by traction upon its limbs and body. This is an unfortunate circumstance, as all such traction deranges the elliptical form of the child; it endangers therefore, delay, and, of course, the safety of the fœtus, not merely by the retention of the arms above the thorax, but by disturbing the flexion of the head, and thus causing a presentation of the base of the cranium at the superior and inferior straits of the pelvis, at the os uteri, or at the os vaginæ. This constitutes, perhaps, the chief danger and objection to podalic version, and a strong argument for its omission, if any safer operation be practicable.

When, therefore, by this manœuvre, an original first position of the vertex has been converted into a second position of the feet, and the expulsive powers of the patient have partially or totally ceased, delivery must be effected by the accoucheur. Traction, there-

fore, should be made upon the lower extremities, as far as practicable, in the direction of the axis of the superior strait, encouraging the patient to assist herself as much as possible. The practitioner should be careful not to make any undue pressure upon the limbs or body of the child, and should constantly attend to the condition of the umbilical cord, occasionally drawing it down to prevent tension, and pressing it to the front part of the chest and toward the temples of the child, so as to diminish, as far as practicable, the danger of arresting its circulation. Owing to the small comparative size of the body of the child, it generally descends readily till the pelvis is at the vulva, and even till it be delivered. At this time the natural tendency to rotation of the pelvis, so that the right hip shall become pubic, may be facilitated.

As the hips pass the os vaginæ, the shoulders are passing through the superior strait and os uteri, traction, therefore, should be suspended sufficiently to allow of the descent of the arms on the sides of the thorax; usually, however, one or both arms will be found retained at the sides of the head. These should now be brought down with the fingers of the practitioner. It is best to operate first upon the sacral arm; this is to be accomplished by pressing the body of the child obliquely toward the pubis, while one or more fingers of the left hand of the practitioner are to be glided along the spine of the child above the left or sacral shoulder, and then directed slowly and carefully along the arm, as far as practicable, toward the elbow. The arm is to be drawn down, and directed toward the face and breast of the infant, and will thus be made to descend along the anterior part of the chest and abdomen, to be delivered externally.

Care should be taken to avoid making traction effort on the upper part of the arm near the acromion process, as dislocation at the shoulder-joint might be induced, or even, as has occurred, fracture of the neck of the humerus. To avoid this accident, one or more fingers should be carried some distance, along the humerus, toward the elbow, before making much tractile effort on the arm. In many cases, however, it will be more prudent, and, at the same time, more efficient to pass the ball of the thumb into the axilla of the infant, and then, with the fingers acting on the humerus, more power can be safely exerted; pressure of the thumb retaining the head of the bone, and thus preventing any disposition to dislocation. We have, also, the advantage of making the arm a lever of the "third kind;" that is, the fulcrum made by the thumb on one extremity of the lever, the resistance being at the forearm, while the power is applied to the arm between the fulcrum and the resistance.

As far as practicable, the position of the arm should be previously accurately ascertained, so that a proper direction may be given to the force applied. It sometimes happens that an arm is thrown behind the neck of the child, and becomes so compressed against the side of the pelvis that to effect its descent is very difficult. Cazeaux says that the arm may descend from above downward; that is, over the side of the head and occiput of the child to the neck, in which case it will be found that the point of the scapula is at a considerable distance from the spinous process of the back. In some cases, it is said, the arm ascends from below upward, that is, over the spine of the child to the neck; in which the point of the scapula will be found near the spinous processes. These two modes of displacement should be borne in mind in practice, as the arm is to be replaced by traction in the direction opposite to that in which it had been displaced. The difficulty will not be so great, when the arm has ascended from below upward; but, in the other case, much difficulty often occurs, and there may be danger of contusion, fracture, or dislocation of the arm. Baudelocque and Dewees advise that the whole body and head should, if possible, be pushed upward, and then a slight rotation be given to the body, so as to facilitate the liberation and descent of the arm. Cazeaux recommends that a complete rotation of the child be made from the anterior to the posterior part of the pelvis; of course, taking great care that the head rotates with the body. This is an operation so difficult, and so dangerous to the child, that it should be conducted with great circumspection, and fortunately it can very rarely be requisite.

The left arm of the child being delivered, the body is then to be carried backward, and to the right, while the fingers of the right hand of the practitioner should now be carried over the spine of the child to the top of the right shoulder, and along the arm, so as to bring it down in a manner just directed, if demanded, carrying the thumb into the axilla, and using the arm as a lever.

The arms being delivered, the head may be found in the cavity of the pelvis. Frequently, owing to the traction effort, the occiput has prematurely descended, so that the flexion has been destroyed, and partial or complete extension of the head exists at the superior strait, so that in the first case there is a presentation of the base of the cranium, the occipito-frontal diameter being concerned, (Plate XXX., Fig. 145,) or of the base of the whole head, in which case the occipito-mental diameter is involved. (Plate XXX., Fig. 146.) In either of these cases traction effort should be suspended until the presentation is rectified, that of the chin being substituted. This can usually be accom-

plished by the fingers alone. In this position two fingers of the right hand should be immediately carried along the breast and neck of the child, and, if possible, to the superior maxillary bone, and fixed on either side of the nose, so that traction effort may be made to cause the descent of the face, and thus induce flexion. The process can be facilitated by insinuating the finger of the left hand along the back of the neck of the child near the pubis to the occiput, which can then be pushed upward, causing the descent of the face; flexion being thus accomplished, and the anterior part of the child's body resting upon the right arm and hand of the practitioner, with his left hand spread over its spine, traction effort can now be safely made of the head downward in the axis of the superior strait, and be continued as the head rotates and approximates the perineum.

Many authors have advised, and drawings have been exhibited in illustration, that a finger should be carried into the mouth of the infant, so as to induce flexion by means of the lower jaw. It is possible that, in some instances, when the upper maxillary bone cannot be reached, or where the child be dead, that such practice may be justifiable; but, ordinarily, it should be condemned, as endangering dislocation of the jaw, and, it may be, rupture of the symphysis menti: it is also, comparatively, very inefficient, owing to the mobility of the lower maxillary bone. By acting on the superior maxillary, which is firmly connected with the bones of the cranium, great power in causing flexion is exercised, without danger.

As the head is thus brought to the lower part of the pelvis, the body of the child should be rapidly carried toward the pubis, so as to be held in a perpendicular position, when the woman is upon her back, with its spine looking toward the abdomen of the mother; if necessary, it should be retained in this position by an assistant, while the practitioner facilitates flexion of the head, if there be any mal-presentation at the inferior strait, or at the orifice of the vagina. Occasionally it may be advisable, again, to pass two fingers into the vagina, so as to act on the face of the child; but generally it will be sufficient to press upon the top of the os frontis through the medium of the posterior part of the perineum, or even through the rectum, by one or two fingers introduced into this intestine. Flexion, also, will be greatly facilitated by passing one or two fingers of the left hand along the spine of the child to the occiput, and pushing it from the pubis directly backward to the sacrum, or, as Dr. Dewees would express it, "directly downward," the woman being on her back. This distinguished obstetrician considers this force applied to the base of the occiput as of great importance.

When the head is still further advanced, so that the

forehead is opposed to the anterior perineum, the fingers in the rectum can be carried to the posterior part of the parietal bones, and even over the occipital protuberance, so as very effectually to accomplish flexion. At this juncture, traction can now be safely applied by drawing the body of the child upward, with the posterior part of the neck parallel to the pubis, and also by means of the fingers in the rectum; the conjoined action of these efforts will be very effectual in causing the descent of the head through the vagina and its orifice, and, at the same time, increasing flexion, so that the chin is continually approximating the breast of the child, and the most favorable diameters of the head are presented to the orifice of the vagina. We wish to direct attention to the great value of making traction directly upward, (Plate XII., Fig. 66,) the neck of the child being parallel to the symphysis pubis: for the base of the occiput being firmly fixed under the symphysis, is immovable, and all the power, therefore, exerted through the medium of the body of the child on the head must be to increase flexion; the whole head being drawn upward, and the occiput being retained by the symphysis, of course the chin must rapidly approximate the sternum of the child. Experience has taught us that traction thus made, with the assistance of the fingers in the rectum, is almost as efficient as that derived from the forceps.

Although this process of artificial delivery may, at first, seem to be complicated, yet, if carefully analyzed by the student, who has mastered the mechanism of labor in such cases, it will be found to be in perfect accordance with nature's operations. It can generally be very easily and rapidly executed, even when no assistance is rendered by the parent.

By this means many lives may be saved, which would have been lost by retention of the arms, by the deficiency of flexion at the superior or inferior openings of the pelvis, and, more particularly, by the improper direction given to the traction effort upon the body of the child, especially when the head is at the inferior strait, or on the perineum. This mode of treatment, in imitation of the normal process of delivery, will often, also, prevent a resort to the forceps, which is important, as these instruments may not be accessible at the moment, or the practitioner may be unaccustomed to their employment.

Nevertheless, it must be confessed that here, as in vertex presentations, great delay must, sometimes, occur from a disproportion between the size of the head and the pelvis and from great rigidity of the vagina and perineum, especially in primiparous labors. Such delays, in pelvic deliveries, are very generally fatal; the cord being compressed, or the placenta being

detached by the contractions of the uterus, now reduced to a small size. In such extreme cases, resource should be had immediately to the forceps or the lever, if at command, or, as has been suggested by Mr. Pugh, an attempt should be made to excite respiration in a child whose body is born, but whose head is still in the pelvis. The mode recommended is to pass two or three fingers to the lower part of the face of the child, so as to press the perineum away from its nostrils and mouth; then, by dashing cold fluids occasionally upon the chest, and enveloping the whole body in warm cloths, and other analogous measures—to maintain the circulation, and excite nervous and muscular action—respiration may be established.

Numerous practitioners report cases of success by Pugh's method, declaring that respiration has thus been kept up, even for half an hour or an hour, before complete delivery has been effected. The suggestion is important, and may occasionally be the sole measure in our power to preserve the life of the infant; we, however, frankly confess that we have not had an opportunity of making any very decided experiment to test its value, always finding that our time is sufficiently employed in the various manipulations to promote immediate delivery, and with so much success that we cannot lament our neglect of this dernier resort of the accoucheur. Indeed, we must strongly advise our younger brethren not to lose important time, in attempting to excite respiration before the head is born; inasmuch as the attempt will very frequently fail, and far more is to be expected in favor of the child's life by rapid immediate delivery, and this can generally be accomplished by manual or instrumental measures.

It may not be hypercritical to observe that the expression "*vagitus uterinus*," or the sound made by the child under the above circumstances, is a misnomer, in almost every case; it should be termed "*vagitus vaginalis*," inasmuch as the head is out of the uterus and in the vagina. True, however, authors do report cases of *vagitus uterinus* as occurring, for example, in face presentations, where the presenting part is still in utero, and the mouth and nostrils of the child are at the orifice of the uterus, the membranes ruptured, the liquor amnii evacuated, and the uterus not powerfully contracted. The possibility of such an occurrence cannot, perhaps, be denied; but certainly it is exceedingly improbable, and however wonderful, can be of little practical importance.

To confirm the observations above made, as to the artificial extraction of the fœtus in pelvic deliveries, and the necessity at every step of the operation to imitate as far as possible the natural modes of delivery, it would be very easy, from the records of the profes-

sion, to detail the horrible results of forcible traction upon the limbs and body of a child, when such traction was made not at the proper time or in the proper direction—when brute force has been substituted for art and science. Perhaps there are but few practitioners who have not seen or heard of cases where the strength of two individuals has been applied to the body of a child, while that of three, four, or even more attendants to the body of the mother, to accomplish the delivery of the head after the body has been born. That the child should ever escape with its life, under such circumstances, is surprising; but it is not to be wondered at that the spinal marrow has been fatally injured, that the spine itself has been dislocated or even fractured, that the limbs have been torn off, or that in some unfortunate cases the body of the child has indeed been delivered, but the head remained impacted in the straits of the pelvis. Surely, in the present state of our science, such practice is exceedingly reprehensible, not to say positively criminal. Science, with very little force, can almost universally liberate the head of the infant with perhaps no additional suffering to the mother, with no injury to the child, and in many instances with safety to its life.

If, however, from any accidental causes, delivery cannot be accomplished by the means and in the manner suggested, or by the forceps, craniotomy and compression of the head are far preferable to forcible traction upon the body.

Artificial delivery of the child, after version by the feet, may not always be practicable by the hand alone; but instruments, such as the blunt hook or forceps, may be demanded, and may be employed under circumstances hereafter detailed.

In the *second* and *fourth* positions of the vertex, version will be performed with the right hand, and the feet should be brought down, if practicable, in the first or left calcaneo-anterior position. In this case, assistance should be rendered precisely in the same manner, and under the guidance of the same principles; but as the spine of the child is now toward the left side of the pelvis, different hands of the practitioner should be employed in the different stages of the operation; the left hand, for example, must be applied to the breast and face of the child to insure flexion, and, at the same time, rotation must occur in the opposite direction to that in the second position.

Should it, however, happen that the child should *descend* in the *fourth* or *fifth* position, some modifications of the manœuvre would be demanded to produce a gradual rotation of the body and eventually of the head of the child, so that the occiput may be delivered toward the anterior part of the pelvis; or if, from any

circumstances, the occiput be thrown to the hollow of the sacrum, still other modifications, especially as to the position of the body of the child, after its delivery, will be demanded. Details upon this subject will be presented under the head of dystocia in pelvic deliveries. To the same division we will defer the few observations necessary for the manual delivery, where the feet or knees may in any way complicate delivery.

Version by the feet may also be occasionally demanded in *breech presentations*. The operation, however, should be restricted by the rules already laid down for version in general; especially it should not be undertaken before the os uteri is fully dilated, or after the breech has escaped from the uterus. If, however, the practitioner should be called immediately before or after the membranes are ruptured, and the first stage of labor be completed, and if, from any complication, immediate delivery be requisite, he may resort to version by the feet.

The *choice of the hand* to be employed is determined by the same rule as in vertex presentations—namely, the practitioner being in front of his patient, that hand which, when in a state of semi-pronation, has the palm toward the anterior part of the fetus, where the feet are located; hence, in the first position of the breech the left hand should be introduced into the vagina and passed to the breech in the manner already designated. The fingers then should be directed posteriorly over the right hip of the child, and the thumb anteriorly over the left hip, carefully avoiding the edges of the os uteri. Then, during the absence of a pain, the breech is to be pushed up in the direction of the axis of the uterus, and then be carried toward the left iliac fossa; while pressure of the right hand on the left side of the fundus of the uterus will give a right lateral obliquity to this organ, facilitating the internal manœuvre. The practitioner should now carry his fingers from the hip along the right thigh to the knee, gradually pressing them, if possible, over both knees and legs so as to reach the feet and receive the *toes* in the palm of the hand, while the index finger is inserted between the ankles. Traction effort should now be made during the absence of a pain, so as to accommodate the natural motions of the limbs and bring them down carefully into the vagina, in the first position of the feet. When both limbs cannot be reached, one may be extracted and subsequently the second, or delivery may be accomplished simply by one extremity, care being taken to prevent any abduction of the limb from its fellow.

In the *fifth* position of the breech the mode of operating is precisely the same; excepting, when the limbs

are drawn down, traction should be made somewhat obliquely, and chiefly by the pubic limb, so as to give a rotary or spiral motion to the body of the child, that the limbs may descend in the first position of the feet, with the heels toward the left anterior inclined plane, and not in the fifth position, with the heels toward the left posterior inclined plane.

In the *second* and *fourth* positions the operation is the same, *mutatis mutandis*, the right hand being employed, the breech directed to the right iliac fossa, the fundus of the uterus toward the left lumbar region, the fingers extending on the left hip and thigh of the child, and the feet brought down in the second position with the heels toward the right anterior inclined plane. In the fourth position, it is requisite that the spiral motion be given to the body of the child, so as to direct the sacrum from the posterior to the anterior part of the pelvis.

In the *third* and *sixth* positions, the manœuvre is similar, and the practitioner may employ either hand at his convenience; if the left hand, however, be used the traction should be made obliquely, so as gradually to rotate the body, that the feet may descend in the first position; or, if the right hand be employed, rotation of the body should be effected in an opposite

direction, so as to bring the feet down in the second position.

Mutation or alteration of the presentation being thus accomplished, artificial delivery is to be conducted precisely as in other cases of podalic version.

It has been suggested to make *version by the breech* in many cases of deviations of the coccygeal extremity of the foetal ellipse, founded upon the general truth that breech presentations are more favorable than those of the feet. Nevertheless, it is much more difficult to effect, and presents so few advantages that it has fallen into very general disuse in Great Britain and on the continent of Europe. It is certainly very seldom desirable, inasmuch, as we shall hereafter show, such deviations generally disappear spontaneously, and, if corrected, no traction effort could be readily or safely made upon the breech. We should strongly advise, therefore, that whenever the hand be introduced into the uterus for such mal-presentations, at least one limb should be brought down and extraction should be made. There is, however, a modification of version by the breech in certain extreme cases, which we deem of great value as regards the safety of the parent, and which will be noticed in speaking of the treatment of shoulder and other presentations of the trunk.

CHAPTER XIII.

OBSTETRIC OPERATIONS.—INSTRUMENTAL MEASURES.

THERE are four important subdivisions of instrumental delivery.

The *first*, in which the instruments are to be applied to the child, so as not to injure its tissues, and to accomplish the process of parturition with safety to the mother and her infant.

This has been termed an operation "for the child," as one main object is to preserve its life, when otherwise it must perish; but, at the same time, it is also an operation "for the mother," as it diminishes the period of her sufferings, and the danger of injury to her tissues, and even to her life.

The *second* subdivision is where instruments are applied to the child—upon the supposition that its death, if it has not actually occurred, is inevitable—with a

view of diminishing its size to such an extent that the delivery may be accomplished.

This operation is known by the name of "embryotomy," or "embryulcia;" or, as it is usually directed against the head, it has been termed "craniotomy," or "cephalotomy."

This is an operation exclusively "for the mother," as the child is to be sacrificed to preserve the more important life of its parent.

The *third* subdivision is where the operation is performed, not on the child, but on the mother, and, although very dangerous to both parties, it affords, when timely and properly executed, a hope that both mother and child will be preserved.

There are two different operations, which have been

recommended for this purpose; the one, in which the parietes of the abdomen, and of the uterus, and sometimes of the uterus alone are divided by cutting instruments to allow a preternatural opening for the exit of the fœtus. It is termed, therefore, "gastro-hysterotomy" in the former case, and "hysterotomy" in the latter. It is more familiarly known by the name of the "Cæsarean operation or section." It is an operation mainly "for the mother," but still there is a strong hope that the child also may be preserved.

The second operation consists in dividing the symphysis pubis, with the view of enlarging the straits and cavity of the pelvis. It is termed "symphysiotomy," or the "Sigaultian operation."

A *fourth* subdivision may be mentioned, the "induction of premature labor," when it is known previously that a living child cannot be born "at term." This operation is chiefly for the mother, but also, if not performed too early in pregnancy, with the expectation of preserving the life of the infant."

FIRST DIVISION OF INSTRUMENTAL DELIVERY.

The instruments employed *for the preservation of the child* may be described under four heads, as they vary considerably in their forms, and are demanded usually under different circumstances. These are the "fillet" or bandage, the "blunt-hook," the "vectis" or "lever," and the "forceps."

FILLET.—It is a bandage, which may be cast around the limbs, or the head of the child, and is doubtless not only the most simple, but the most ancient instrument employed in obstetrics. Formerly, when the science of midwifery had not been cultivated, this mode of operation was often injudiciously and injuriously resorted to. Of late, it has been almost entirely restricted to breech presentations; but, doubtless, it might be extended very advantageously to some other cases, which will be hereafter noticed. In presentations of the breech, where artificial delivery becomes necessary, and when the assistance, which can be rendered by the fingers of the practitioner are inadequate, and where it is no longer practicable to resort to version by the feet; a strong band or fillet may be introduced between the thigh and body of the child over the groin, so that, by this means, traction effort can be made to cause the descent of the fœtus until its breech be expelled at the vulva, and the limbs unfolded: after this, of course, the fillet is useless, and delivery must be perfected by manual means.

The character of the fillet is of importance. It should be strong, and, at the same time, a very soft, pliant

material, so as not to injure the skin by its roughness or stiffness, or lacerate the tissues, when traction is made. A strong bandage of new muslin, or linen well washed, a broad, soft ribbon, or a band of soft leather is generally employed, and will often answer very well. Necessarily, however, under the influence of traction, the bandage is reduced to the state of a cord, with numerous folds and irregularities, running across the groin; hence, the delicate tissues are bruised, and even lacerated, so that inflammation, ulceration, or sloughing, endangering the life of the child, may ensue. It would be an improvement, therefore, to have that part of the bandage, which will come in contact with the limb of the child, doubled longitudinally, and the edges sewed together; the interior can then be stuffed with cotton, wool, or other soft material, so as to give a cylindrical form to the central portion of the fillet. This would, at least, partially obviate a great objection to its employment.

A fillet of thin whalebone has also been recommended, especially in cephalic presentations. We

Fig. 38.



The Whalebone Fillet.

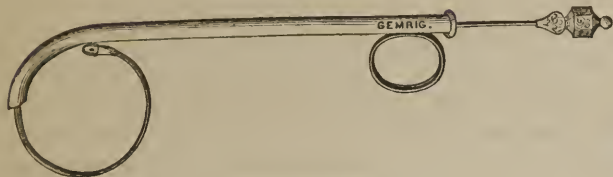
should fear, however, that it would contuse, or even lacerate the tissues of the scalp.

The *introduction* of the fillet over the groin is not always an easy operation, but it can generally be effected most readily by acting on the pubic limb. The fillet and the tissues of the mother should be well anointed, the flat portion of the bandage should be doubled, and drawn tensely over the extremity of the index finger, by which it can then be readily carried through the orifice of the vagina to the pubic hip, and guided between the thigh and the abdomen as far as possible. The practitioner, by a slight rotatory motion of the finger, should now disengage it from the bandage in the groin, and then double another portion of the fillet, and push it also into the groin, and thus in succession, until it has so accumulated that it will be found descending upon the opposite or inner side of the thigh, when it can be hooked down by the finger, and drawn out externally, thus leaving the loop of the fillet over the limb, and the two extremities in the hands of the practitioner.

Another mode of application of the fillet, perhaps more easily executed, is by means of a curved spring

canula, as recommended by Bellocq, for the transmission of ligatures from the mouth to the nostrils.

Fig. 39.



Spring Canula.

It will be best to attach a loop of thread to the perforation at the extremity of the spring stilette. The point of the instrument, the spring being retracted within the canula, can be readily inserted far over the groin; then, by pushing forward the stilette, the extremity will readily descend on the inside of the thigh, and can be drawn downward. The fillet can now be inserted into the loop, and be drawn to the inside of the thigh, and thus to the groin on retracting the spring within the canula; and then the whole instrument may be withdrawn, bringing the fillet with it over the thigh of the child.

The *modus operandi* of the fillet is simply traction. During the existence of a pain, or at regular intervals when no pain exists, traction should be made directly downward in the axis of the superior strait, until the breech has reached the floor of the pelvis, and advanced on the perineum; then the direction of the traction will be gradually altered, as the lateral flexure of the child increases, and the breech approximates the vulva.

It is well to observe, that the use of the fillet should be suspended as soon as the practitioner can render effective assistance by means of his fingers or hand, as there must be always more or less danger of injuring the tissues of the thigh by this apparently simple agent. In modern practice the fillet is occasionally employed in cases of prolapsed arm or leg, not for the purpose of traction, but merely to prevent the retraction of the protruded extremity, too far within the maternal organs.

Although the use of the fillet is thus greatly restricted at the present time, there are cases of cephalic presentations in which a bandage may be safely and advantageously employed to facilitate delivery, when properly applied by one well acquainted with the mechanism of labor, and who has clear ideas of the indications to be fulfilled. This instrument, however, must, in such instances, be regarded as a mere substitute for the lever or forceps, when such agents should, unfortunately, be not at command. The mode of applying the fillet, the circumstances under which it is justifiable, and the rules which should regulate its employment,

will be hereafter detailed, in speaking of the varieties, normal and abnormal, of cephalic presentations.

BLUNT HOOK.—This (Plate XIV., Fig. 71) was also, like the fillet, much employed in ancient times, during

Fig. 40.



Blunt Hook.

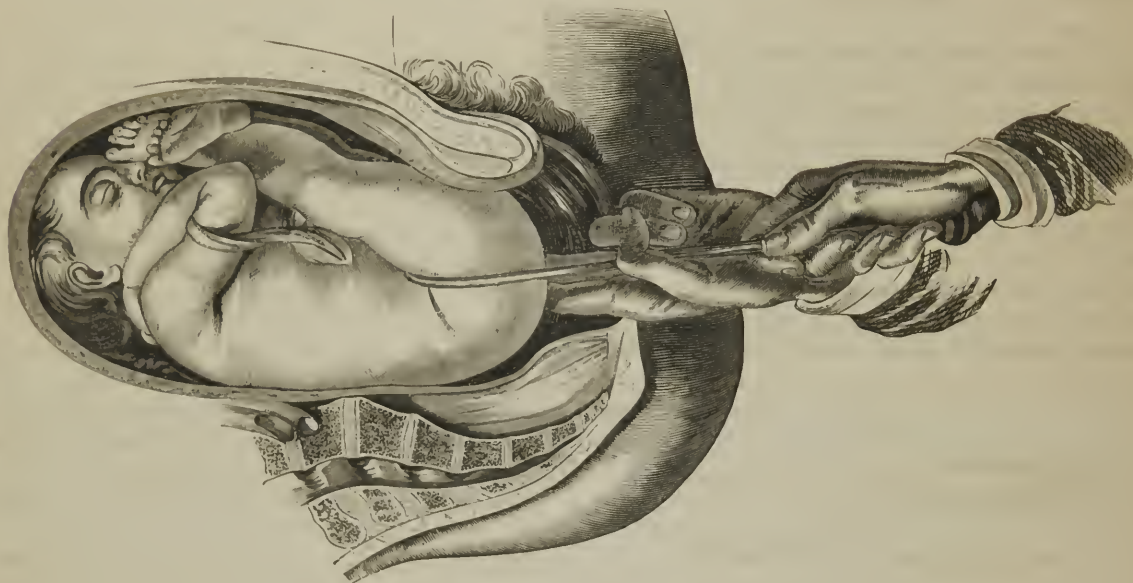
the ignorance of obstetric science, in impracticable cases of labor; and, in conjunction with sharp hooks or crotchets, constituted the chief agents of the practitioner. Its use, however, is now greatly restricted, and, under this division of instrumental delivery, where there is hope of preserving the child, it is limited almost exclusively to breech presentations, under the circumstances to which the fillet is applicable. Indeed, it depends upon the convenience or judgment of the operator, whether the blunt hook or the fillet should be resorted to; the former, perhaps, has the advantage of being more easily applied, but it is not, by any means, more efficient, and, perhaps, is more liable, from its hard, unyielding character, to injure the tissues of the groin, than a fillet, especially when this last is "stuffed" with soft materials. The size and curve of the hook employed in these pelvic deliveries should correspond to the usual size of the upper part of the thigh of the infant. Smaller hooks may often be demanded for other conditions, as in the operation of embryotomy, but would prove very dangerous in pelvic deliveries.

The usual preparations for delivery being arranged, and the friends of the patient being advertised of the necessity of the operation; the instrument should be immersed in warm water, so as to bring it to the natural temperature of the body, and then anointed. The *introduction* should be accomplished in the direction of the axis of the vagina, the point of the hook being turned toward the perineum, so that its breadth should correspond to the long diameter of the os vaginae. The instrument being held by one hand of the practitioner, two or three fingers of the other should separate the labia, be a guide to the instrument, and, at the same time, prevent any pressure upon the tissues of the mother. As soon as the hook has passed into the vagina, the handle should be rapidly depressed, so as to bring it in the direction of the axis of the body of the child; while the instrument should be twisted, so as to bring the hook in contact and parallel with the pubic hip, the point being directed forward toward the thigh.

By gently rotating the handle and depressing it toward the perineum, the point guided by the finger of the practitioner can be made to traverse the groin to the inside of the thigh; then by elevating the handle toward the pubis, the point will descend on the inside of the limb, where it will be easily recognized; care being taken, especially if it be a male child, that the genitals are not involved.

The instrument being thus placed, traction effort should be made directly downward, the practitioner keeping an index finger between the limbs of the child on the point of the instrument, so as to be satisfied that this point does not impinge against any portion of the thigh. To accomplish this, the handle of the instrument must be carried somewhat forward, so as to be slightly oblique to the body of the child, as other-

Fig. 41.



Blunt Hook in Breech Presentation.

wise, if too much depressed, the extremity of the hook would dangerously press upon the tissues of the groin. This obliquity of the instrument during traction, although necessitating some loss of power, is, for the above reason, very important.

The danger of the blunt hook, therefore, is the necessary contusion from a hard steel instrument acting on the delicate tissues of the thigh; this is, of course, aggravated by any increase or continuance of the force employed, and especially by any mal-location of the point of the hook. Although this danger seldom involves the life of the child, yet the operation is not unfrequently followed by abrasion of the skin, ecchymosis, laceration, and subsequently by inflammation and suppuration; occasionally, also, ulceration, and even sphacelus have taken place, which, upon ordinary occasions, may not be productive of any serious mischief, but may become fatal in consequence of the inflammation and sloughing extending to the large blood-vessels, nerves, and other important tissues of the groin. This is comparatively a rare accident, yet it demonstrates the necessity of great caution, and

perhaps the substitution of a soft cylindrical fillet for the hard steel hook.

The blunt hook, therefore, should be generally restricted to embryotomic operations.

Vectis, Tractor, or Lever.—This is a long, narrow steel instrument, having usually a wooden handle at one extremity, and at the other it is enlarged to a triangular shape, and curved, so as to be adapted to the convexities of the cranium. (Plate XIV., Fig. 72.) This curve is termed, therefore, "cephalic." The greatest breadth of this extremity usually varies from one inch and seven lines to one inch and ten lines. It is thin, so as not to occupy more space than is requisite, its thickness varying from one to two lines. It is also fenestrated, not only for lightness, but that it may slip less readily over the scalp. The degree of curvature varies also in different instruments,—the greater the curve the more difficult may be the introduction, but the greater will be its efficiency.

The instrument which the author has been in the habit of using, (Plate XIV., Fig. 73,) is somewhat of the form of the letter S, about nine and a half inches

in length, with a blade or cephalic curve at either extremity, one larger adapted to the form of the head, the other smaller for the extraction of globular pessaries or other foreign bodies from the vagina. The shank of the instrument is thin and flat, being about one inch in breadth. This instrument is portable, and fully adequate for all ordinary purposes, while the curvature and flatness of the shank render it more efficient, and also safer for the mother's tissues, being better accommodated to the curvature of the pelvis.

The question as to who was the original inventor of the vectis has excited great discussion, and the whole original history of this instrument is still involved in obscurity. It is most probable that the Chamberlens, of England, to whom the credit is now universally given of devising the modern obstetric forceps, were also the inventors of the lever. This has been rendered the more probable of late by the discovery, in 1815, of a box of obstetric instruments, concealed in a vault in a house in Essex, England, originally the property of Peter Chamberlen, in which was a small lever, in addition to several modifications of the forceps. This lever has a curve and a fenestra, similar to

Fig. 42.



Chamberlen's Lever, (Front and Side Views.)

those of the modern vectis, with a comparatively short handle. Moreover, it is asserted that Hugh Chamberlen fled to Holland in 1687, and became intimate with Roonhuysen and other distinguished obstetricians, at Amsterdam, to whom, it is reported, he confided his secret. Years, however, elapsed, during which the knowledge of this instrument was confined to a few practitioners in Holland; and when the secret was published, in 1753, the whole credit of its invention was given to Roonhuysen. His lever, as here por-

Fig. 43.



Roonhuysen's Lever.

trayed, was a thin piece of iron, curved at either extremity, and without the fenestra; certainly, therefore, different, in many respects, from the vectis of Chamberlen, although possessing the curve, which consti-

tutes the essential part of the instrument. Various modifications have been made in the shape of the vectis since the first description given of it in 1753. Lowder's lever, already described, is the one generally preferred, with a long rounded shank and wooden handle.

The *reputation* of the vectis has been very fluctuating. Its early advocates in Holland and England were numerous, and insisted that it was far superior even to the forceps. It is still recommended by Boddaert, of Belgium, as very efficient even in cases of deformed pelvis, where the forceps has failed. In France and Germany it has received less attention.

The result of the severe and sometimes acrimonious discussions as to the relative advantages of the vectis or forceps has resulted in the complete triumph of the latter instrument: the vectis having fallen into comparative disuse¹ in Europe and America.

We find it stated, for example, that Dr. Collins, of the Lying-in Hospital, Dublin, in sixteen thousand four hundred and fourteen cases, used the lever only three times, and Dr. Shekleton, in thirteen thousand seven hundred and forty-eight cases, but once.

The same appears to be true in France, where the lever is restricted to cases of mal-presentation, and never used as a substitute for the forceps.

In America the vectis has received but little attention.

This neglect has, we think, been very unfortunate. It has arisen partly from ignorance of the mechanism of labor in the various presentations and positions of the child, and partly from the want of a due appreciation of the respective value of the vectis and forceps, and the peculiar circumstances under which the one may be preferable to the other. Although one may be frequently substituted for the other, they have each their respective spheres, and hence are applicable to different cases of labor, or even to different periods of the same labor: the lever altering the presentation or position of the head preparatory to the employment of the forceps. They should not, therefore, be considered as rivals, but as co-ordinate agents. Their relative advantages can be better understood after considering the application and the *modus operandi* of each of these most valuable instruments.

The *introduction* and *application* of the vectis are to be conducted precisely in the same manner and on the same principles as will be detailed in the use of the forceps. Suffice it to say, at present, that the

¹ See Osborn's Essays for a very severe criticism on the vectis, in opposition to the then very high authority of Denman, who considered it in some respects superior to the forceps.

concave surface of the lever should always be applied to some portion of the convexity of the cranium, and seldom to any portion of the face in a living child, as the features might be bruised or mutilated by its pressure. If possible, its application should be confined to the parietal and occipital regions, although sometimes it may be justifiable to apply it over the frontal region of the head, or even to the side of the face and temple.

The *modus operandi* of this instrument, as its names indicate, is two-fold: First, as a *Tractor* or *Vectis*, by which portions of the head may be made to advance, by simply drawing the instrument more or less directly downward; and second, on the principle of a *Lever*, so that an additional force may thus be given to its tractile power.

First, therefore, as a *Tractor* or *Vectis*, its operation may be exemplified in the first position of a presentation of the anterior fontanel, (Plate XXI., Fig. 109,) where the occipital protuberance points toward the left anterior inclined plane, and the forehead toward the right posterior inclined plane; in which case it is evident that flexion is deficient, and the occipito-frontal diameter corresponds to the oblique diameter of the pelvis. The indication, in this case, is to draw down the occiput, so as to induce flexion, for which purpose the tractor is very valuable. It should be introduced in this position toward the posterior and left portion of the pelvis, and its curve be brought into contact with the left side of the base of the occiput, then gradually inclining the instrument so as to cover, if possible, the occipital protuberance, carry the handle of the instrument well back toward the perineum. It will now be found that the curved extremity of the lever is firmly applied, and operates like a hook upon the base of the occiput, and, if traction effort be now carefully made, *during a pain*, in the direction of the axis of the superior strait, considerable power will be exercised, causing the descent of the occiput, and thus assisting the expulsive forces of the uterus. Caution is required not to allow the handle of the instrument to advance toward the pubis, as then the curve of the lever will glide upon the surface of the head, and no good effects will result; and, moreover, if the traction be continued, it might suddenly slip from the head, even with injury to the scalp. In using force, therefore, with the lever, minute attention should always be paid to the direction of the handle, so as to keep the concavity of the instrument in firm contact with that portion of the head upon which the operation is directed. This will be more effectually accomplished if one or more fingers of one hand should be applied to the shank of the instrument within the vagina, so as to maintain the blade in close

approximation to the head. In all cases, however, there will be some gliding of the lever from the convexity of the head, which is unavoidable, as the occiput descends and its position changes. But this, if the instrument is well constructed, and the practitioner sufficiently cautious, is productive of no mischief.

There are many other cases where flexion and rotation, or even extension, may be advantageously facilitated by this tractile power of the instrument, which will be specified under the head of *Dystocia* from malpresentation, etc.

Second. As a *Lever* much more power is given to this agent. Take, for example, a case of an occipito-posterior position of the vertex, where rotation has brought the occiput to the lower part of the sacrum and the top of the os frontis against the body of the pubis. (Plate IX., Fig. 55.) Assistance, in such cases, may often be demanded to increase that degree of flexion now essential to a safe delivery, and so difficult to be accomplished. The lever, in this case, may be introduced without difficulty over the side of the parietal bone to the base of the occiput, gradually depressing the handle toward the perineum, and carrying it a little outward toward the thigh of the mother. By drawing down the instrument in this direction, it will be serviceable simply as a tractor; but it is evident that while this traction effort is being made, if the handle of the instrument be carried still further toward the thigh, a lever-like motion is given—the hand of the practitioner being the power at one extremity, the resistance given by the head of the child being at the other extremity, and the fulcrum being at the side of the perineum and the ramus of the ischium; thus constituting it a lever of the “first kind.”

It is manifest, however, that by thus making the fulcrum against the soft parts and bones of the parent, much contusion and injury would be sustained; this, therefore, should be carefully avoided. While, therefore, the practitioner is acting with his right hand on the handle of the lever, the fingers of the left hand should be applied on the exterior surface of the shank of the lever, while the thumb of the same hand may be fixed upon the opposite temple of the child; then by carrying the handle of the instrument to the side, when traction is made, the fingers of the left hand of the practitioner become the fulcrum, while the thumb not only increases its stability, but at the same time gives a lateral support to the opposite side of the hand, thus fixing the instrument more firmly, and giving greater efficiency to its operation.

We learn, however, from Churchill, Ramsbotham, and others, that the vectis is more frequently used at the present day as a lever of the “third kind,” as

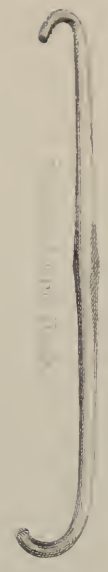


Fig. 10

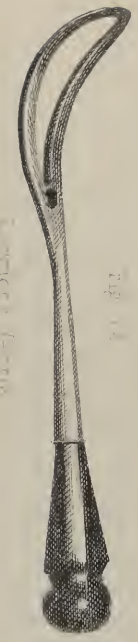


Fig. 11



Fig. 12

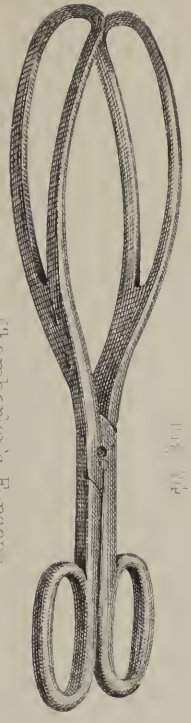


Fig. 13

Fig. 14



Fig. 15

Fig. 16

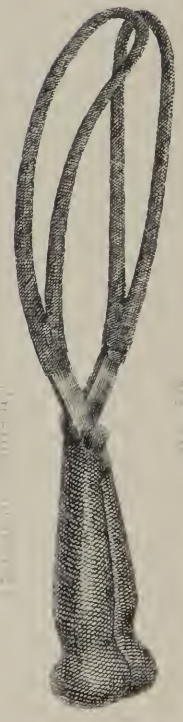


Fig. 17

Fig. 18

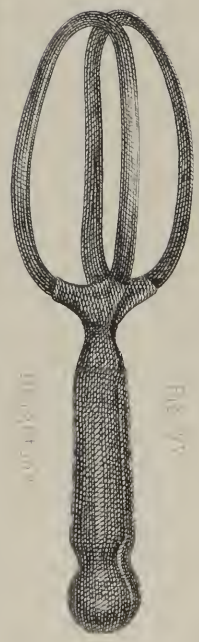


Fig. 19

Fig. 20

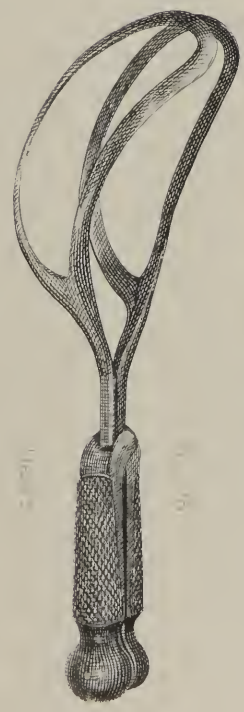


Fig. 21

Fig. 22



Fig. 23

Fig. 24

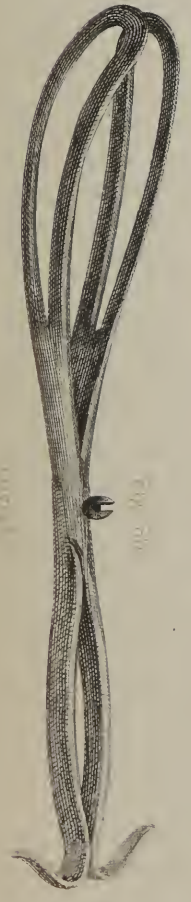


Fig. 25

Fig. 26

originally recommended in 1783, by Dr. Dease, of Dublin. In this case, the instrument having been applied, the practitioner holds the extremity of the handle firmly with one hand, thus making it a fulcrum, the weight or resistance being at the occiput; the fingers of the other hand are then applied to the shank of the instrument as near as practicable to the child's head, and are used as the power. Perhaps one advantage of this mode of operating is, that there is less danger of making undue pressure on the mother's tissues.

Accoucheurs accustomed to the lever can thus safely and powerfully facilitate the flexion and descent of the head; and some have given it the preference to the forceps, as but one blade is to be introduced, and there is no difficulty in its adaptation to the head of the child.

Although the lever may be used in these and some other analogous cases as a substitute for the forceps, yet nearly all practitioners, at the present day, consider it far less efficient than the forceps, not only as being more liable to slip and thus injure the tissues of the mother or child, but as being much less powerful, as Dr. James, in his edition of Merriman, quaintly observes, he cannot conceive how one lever can act more powerfully than two. We shall hereafter demonstrate that the lever is a very important and invaluable instrument in cases of defective rotation, where it should often be employed as a substitute for the forceps in very many of those cases where the use of the latter instrument is recommended by the highest professional authorities.

The advantages and disadvantages of the vectis may now be sufficiently evident. Its chief *value* is to alter unfavorable presentations, by increasing flexion of the head, and facilitating rotation in those cases where manual assistance is not sufficient; although it is also powerful in promoting the descent of the head, especially when employed as a lever. This last is of secondary importance, as we have certainly in the forceps a far more efficient agent for this purpose. The *disadvantages* of the vectis are its instability, and the danger of bruising or of otherwise injuring the tissues of the child and of the parent. These dangers may be obviated, in a great degree, by keeping the cephalic curve in close contact with the cranium, by means of the fingers of the practitioner operating upon the shank, and by giving a proper direction to the handle, so that no injury will be sustained by any slight motion of the lever on the scalp. The danger of injuring the tissues of the mother, which has been urged with great force as a strong argument against the lever, should never be forgotten, although by a careful

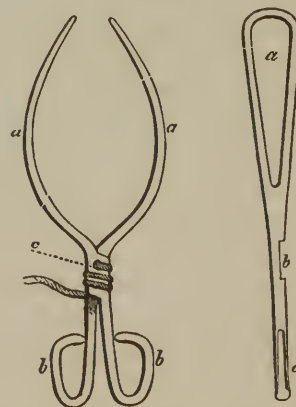
practitioner this can be entirely obviated by using his fingers as the fulcrum. For these reasons, as well as for its comparative inefficiency as a tractor, it has fallen relatively into disuse; but, nevertheless, in special cases, it must be regarded as a most valuable agent in many complicated labors.

OBSTETRIC FORCEPS.

The *forceps* is a steel instrument, which may be well termed a pair of artificial hands, adapted to the form and size of the child's head, which, when applied, may be used with great safety and efficiency in accomplishing delivery, otherwise difficult or impracticable. It is the most valuable of all obstetric instruments, and must be regarded as one of the most signal blessings conferred on woman by obstetric science, for the diminution of her sufferings, anxieties, and dangers, and for the safety of her offspring.

HISTORY OF THE FORCEPS.—There can be no doubt, at the present day, that the profession and the public are indebted to Dr. Paul Chamberlen, and his sons, Hugh and Peter, for the invention of the forceps. Dr. Churchill informs us that from a publication of Dr. Peter Chamberlen, termed "A Voice in Rhama," issued in 1647, he mentions his father's discovery of an instrument for saving of infantile life. That this was the obstetric forceps has been positively proved by the discovery, in 1815, as already alluded to, of a box of the Chamberlen instruments. A description of these instruments by Mr. Carwardine, to whom they were presented, was published in the ninth volume of the Transactions of the Medico-Chirurgical Society of London.

Fig. 44.



Chamberlen's Forceps, Front View.—*a*. Blades. *b*. Handles. *c*. Joint. Side View.—*a*. Fenestra. *b*. Groove for the Joint. *c*. Handle.

The different instruments, thus found, evince the progress of discovery, from the single blade, or lever, to

the double blade, each of which could be introduced separately, and then connected by a joint. This joint, at first, consisted of a simple pivot, which was received into a corresponding "notch" or "hole" in the other blade. (Plate XIV., Fig. 74.) This being inconvenient in locking, a hole was made in each blade, through which a tape was passed, and wound tightly around the joint.

It thus appears that some time previous to 1647, the obstetric forceps was devised by Dr. Paul Chamberlen, but remained a secret, in his own family, for nearly half a century. It is probable that the instrument was shown to some few physicians in Amsterdam, toward the close of the seventeenth century, but it does not appear to have been employed, in England, by any but the Chamberlens, until the beginning of the eighteenth century. About this time, Messrs. Drinkwater, Chapman, and Giffard employed forceps very analogous to those invented by Chamberlen. Still, however, great secrecy was maintained as to the employment of this instrument, even by Dr. Chapman, who, although he explained its principles and uses, to a few pupils, gave no public description of it, until he was severely criticised on this account, says Dr. Ramsbotham, by Mr. Butler, in the *Edinburgh Medical Essays and Observations* for 1733. Dr. Chapman apologized for his conduct, and gave a description and drawing of his forceps.

To Smellie, in England, and Levret, in France, the profession are indebted for very important modifications in the Chamberlen instrument; and their instruments, although almost indefinitely varied by many practitioners, are the types of the modern obstetric forceps.

DESCRIPTION OF THE FORCEPS.—The great peculiarity of the obstetric forceps is, that they consist of two branches, distinct from each other, so that each blade can be introduced separately into the vagina, and be afterward locked together, so as to give them all the mechanical advantage of a common pair of forceps. This is, virtually, the important invention of Paul Chamberlen; for pincers, of various kinds, had been previously employed in extracting the child in the operation of embryotomy. The least reflection shows that no forceps, with a fixed joint, and large enough to embrace the head of a child, could possibly be introduced. The simple idea, therefore, of having a forceps so constructed that the blades could be easily locked and unlocked, and thus allow of their separate introduction, is the important improvement, for which the public is indebted to the Chamberlens. The great merit justly due to the father and the sons of this now distinguished family is exceedingly marred, because they,

acting too much in the spirit of their age, kept secret, for more than half a century, an improvement, which ought to have been promulgated, immediately, for the benefit of humanity.

The forceps, as represented in Plate XV., Fig. 84, consist of two branches, each of which is subdivided into four portions, viz., the handle, the surface for the joint, the shank, and the blade proper. This last comes into contact with the head of the child, and is curved, so as to be accommodated to its convexity, and is, therefore, termed the "cephalic curve." There is also an additional curve on the edges which are convex and concave, corresponding to the curve of the pelvis, and hence called the "pelvic curve." The "shanks" intervening between the joint and the blades are important, as they increase the length of the blades, so that they can be introduced, even to the brim of the pelvis. The pelvic curve and the shank are wanting in many forceps. The surface for the joint is flat, and the direction is at right angles with the blade; so that when the two surfaces, forming the joint, are in contact, the blades must be parallel to each other. The character of the joint, as will be seen, varies in different instruments.

The forceps are either "long" or "short;" these words, however, have reference generally to the handles of the instrument, rather than to their whole length: although usually the short forceps of the English have also short blades, yet the German forceps have long blades and short handles, but still practically they may be regarded as short forceps.

The forceps, which have merely the cephalic curve, are called "straight," as the blades are in the same direction as the handles, while those which have the pelvic curve are designated as the "curved" forceps.

The long forceps, whether English or French, have the pelvic curve. This is the case also with the German forceps. The original Chamberlen forceps were straight, with the single or cephalic curve; and this form is still preferred by many British practitioners. It is doubtful to whom we are indebted for the pelvic curve; it was given certainly by Levret to his forceps, and Smellie used not only the straight, but also the curved instrument, in many of his operations.

The French almost invariably adhere to the long forceps, as introduced by Levret, somewhat modified by Baudelocque, and also by Dubois, the present leading obstetrician in France.

In Germany the general character of the forceps, as to the shanks and blades, is similar to the French; but the handles are short, like the English forceps.

In America there has been a very indiscriminate employment of the short or the long forceps, according

to the influence of English or French works on the minds of the students, but more especially on the recommendations of popular teachers in favor of one or the other modification.

In this city, for example, Dr. Thomas C. James, the first Professor of Obstetrics in the University of Pennsylvania, recommended the short forceps, of Dr. Haighton, to the thousands of students who for more than thirty years received his instructions. His predilections were probably determined during the period of his studies in London, and when attending the lectures of Drs. Osborn and Clarke, in that city.

Dr. Wm. P. Dewees, a cotemporary of Dr. James, imbibed the principles of our science from the works of Baudelocque and other French authorities. Hence he became prepossessed in favor of the long forceps. These he employed, and was occasionally very severe in his criticisms upon the short forceps. He was very successful as an operator, and thus greatly contributed to the employment of this instrument, the real superiority of which, we think, can be clearly shown.

American practitioners are still divided upon the subject, but every year, as the principles of science are better understood, the French forceps, somewhat modified, are more generally used. Their relative advantages and disadvantages will be presently compared.

The Short Forceps.—The length of these vary from ten to twelve inches, and are usually without shanks, the blades diverging from each other at the joint; the handles are usually about four to six inches in length, and generally made of steel plates, covered with wood. Formerly, by Smellie and his successors, the handles were covered with leather, so as to prevent any noise when brought into contact—a precaution now regarded as of no importance, while the leather is objectionable on the score of cleanliness. Their thickness is about two inches, so as to accommodate the size of the hand; while the wood is roughened, grooved, etc., according to the notions of the practitioner, so as to give greater firmness to his grasp of the instrument.

The mode of locking is important. The pivot, or tape, belonging to the original Chamberlen forceps, was soon found to be inconvenient. A notch was then made in the right blade, which was received by a pivot on the left blade. In Smellie's forceps we find a deep horizontal notch at this extremity of each handle, to receive the opposing part of the opposite blade. This mode of union is generally maintained in England to the present time, and is known, therefore, as the English Lock. It is recommended by the facility with which the union can be accomplished, and

also disengaged; and yet sufficient firmness is given by this mode of junction. It is certainly far superior to the tenon and foramen of the Chamberlens, and also of the French forceps.

The blades of the instrument are about six inches in length, measuring from the joint, from which they immediately diverge. The shape varies very much: that of Smellie (Plate XIV., Fig. 75) being represented by the section of an egg—the broadest part of the section, being toward the extremity of the blade, and measuring only one inch and four to six lines, and gradually tapering to the joint; while in Haighton's forceps, (Plate XIV., Fig. 77,) probably the best of the straight forceps, the greatest breadth is nearer the joint, and measures about two and a half inches. Each blade is fenestrated for the purpose of lightness, and to give more firmness to the application of the instrument; in some instances, as in Haighton's forceps, where the blades are broad, the fenestræ are proportionally large, so as to receive the parietal protuberances or other projections of the head, and thus prevent the blades occupying any space in the cavity of the pelvis when once properly applied—a practical fact of great importance. The width of the rims varies from three to six lines, sufficient to give strength to the instrument, in conjunction with their thickness. This measures from one to three lines, being generally greater at the inner margin constituting the fenestra than at its outer edge. The blades were originally covered with leather to prevent, it was supposed, any injury to the child or mother. This was found to be useless, and the leather, by imbibing the fluids of the mother, became a source of irritation, and even of danger in subsequent cases. The blades are now made perfectly smooth and polished, being convex externally, and concave internally, in the direction of their length, corresponding to the form of the head, and hence termed the "cephalic curve." To accommodate it more exactly to the form of the head, Mr. Haighton has the blade concave from one edge to the other, transversely. Hence, the internal surface of the blade corresponds so exactly to the form of the head that when pressure is made no injury will be sustained by the scalp.

When the "pelvic curve" was adopted, very little additional change was made in the form of the blades.

Smellie's curved forceps (Plate XIV., Fig. 76) differ but slightly from his straight instrument, as to the form of the blades and handle; the former are somewhat longer, and have the additional curve. Various modifications have been made of Smellie's curved instrument, more or less important, and they are generally known under the name of the long English for-

ceps. The form which is most usually preferred in Great Britain is represented in Plate XIV., Fig. 79, and, from the length of the shanks, this can be employed when the head is at the superior strait.

Dr. Davis, of London, has devoted much attention to instrumental midwifery; and his forceps (Plate XIV., Fig. 78) have been much used in different parts of this country, having been strongly recommended by Dr. Meigs. The handles are short, but the blades are comparatively long, and are divided into two portions: the one, or the cephalic portion, which embraces the head, and the other, the shanks, extending to the handles. These shanks run parallel to each other, and are slightly separated, so that the instrument can be introduced deeply into the pelvis, without distending the os vaginæ. The blades are very broad, and, like Haighton's, are curved from one edge to the other, so that the internal surfaces will press flatly on the head of the child, with little or no danger of injuring the scalp; and the fenestræ are so large as to receive the prominent parts of the cranium, and thus prevent any additional pressure on the mother's tissues. By these arrangements a firm grasp can be made on the head, with little danger to the scalp of the child, provided the blades are accurately adjusted to the sides of the head. They are, doubtless, an efficient instrument, but are not adapted, in the opinion of Dr. Davis himself, to effect delivery at the superior strait. The great breadth of the blade is objectionable, as they can hardly be introduced, especially in first labors, without inflicting pain; and this breadth also prevents their being readily manipulated within the pelvis, when the head is oblique or transverse.

The Long or French Forceps.—Those generally known in this country are the "Baudelocque forceps." (Plate XV., Fig. 81.) They are made of well-tempered steel, smooth and polished, and are generally about sixteen inches in their entire length—six or seven inches being the length of the handles, and nine or ten inches from the joint to the extremities of the blades. The length of the blades proper is about seven inches; the shanks from the blades to the joint are three inches. At the joint the two opposing surfaces are flat, while the handles, somewhat rounded, are about half an inch in thickness, larger near the joint, and gradually tapering to their extremities, where they are curved to the form of a "blunt hook," for which instrument they may be substituted in case of emergency. The handles are not perfectly parallel—they bulge slightly outward, so that when brought together they are in contact only at their extremities. This outward curve enables the practitioner to grasp them more firmly.

The *joint* of the French forceps is of the tenon and

mortise character—the pivot or tenon being received into an orifice in its fellow. This arrangement, although securing a very perfect lock, is, nevertheless, very inconvenient in practice, as it will always be difficult to bring one blade in such exact opposition to its fellow as to allow an easy junction. Time is lost, and sometimes undue force is required to lock the blades. The Baudelocque forceps, therefore, in this country has been very much improved by adopting what is termed Siebold's or the "German lock." In this, the pivot or tenon is conical, its truncated apex being so arranged as to screw into the left branch of the instrument, and it is surmounted by a thumb-piece; the other branch of the instrument has a conical notch, the central portion of which is larger than its entrance, corresponding to the shape of the pivot. By this arrangement, when the screw is somewhat loosened, the handles are as readily joined as in the English forceps, while, by a few turns of the screw, the lock is perfectly secured, owing to the conical form of the pivot now occupying the centre of the mortise, and being too large to pass through the lateral opening. The reverse action of the screw pivot allows the separation of the blades with perfect facility.

In the French forceps the flat surfaces connected with the joint are comparatively large, and thus tend to secure the proper parallelism of the blades and handles. This junction by tenon and mortise is often known among mechanics as the "male" and "female" joint; hence, in professional language, the blade with the pivot is called the "male branch," and that with the mortise the "female branch." It will be seen that the male branch is always applied toward the left side of the pelvis, and the female branch to the right side; so that the pelvic curve of the forceps would correspond to the curved line of the pelvis; hence, the male branch is also known by the expression of "left branch," and the female of "right branch." Either of these modes of designating the branches may be adopted in practice, according to the existing custom, as no serious objection can be advanced against their employment.

The blades of the French forceps, or that portion which intervenes between the joint and the extremities, diverge gradually from the lock, as in the English forceps, but for about three inches are comparatively narrow, and are termed the *shanks* of the instrument; while the proper *blade*, extending some six inches further, is, as to its general form, similar to that of Smellie's forceps—that is, each blade resembles the section of an egg, the greatest breadth, toward the extremity, measuring one inch and three-quarters, from which it gradually declines toward the joint. Hence, the

fenestræ are long, and large at the extremity, but narrow toward the shanks. The broadest part of the fenestræ is applied to the cheeks, and the smallest part over the sides of the head and parietal protuberances, which projections, therefore, cannot be received into the fenestræ. Hence, these forceps necessarily occupy space in the cavity of the pelvis, and as the edges of the fenestræ are often four lines in thickness, six or eight lines may be regarded as added to the transverse diameter of the head whenever these instruments are used.

The exterior of the blade is convex in its length, and also from one edge to the other, being thus well adapted to the concavities of the pelvis; but the internal or cephalic surface is concave only in its length. Hence, although the outer edge of the blade may be thin, the edge of the fenestra is comparatively thick, and the blade is not accommodated to the surface of the cranium. Unequal pressure is, therefore, made, especially by the margin of the fenestræ, upon the scalp, so that in bad cases the tissues have been cut in a line corresponding to the margin of the fenestræ. This is, of course, a serious objection, and belongs even to the best Continental forceps which we have examined.

The *shanks*, or that part intervening between the blades and the joint, in the French forceps, may be regarded as continuations of the blade, inasmuch as they are a continuance of the curve of the proper cephalic portion of the blade to the joint, from which they regularly diverge. They are, however, free from fenestræ, and are very important, by allowing the blades to be introduced far into the pelvis, even to the superior strait, without the lock entering the vulva, thus giving a decided advantage to the French over the English forceps; the use of the latter being restricted to the inferior strait, or, at any rate, to the cavity of the pelvis.

To M. Levret belongs the great credit of devising the basis of the forceps just described, including the "pelvic curve," which so admirably adapts it to all the varieties of forceps operations. Levret's forceps (Plate XIV., Fig. 80) as originally made, had an elevated line on the inner surface of the blades, and near the margin, the object of which was to prevent the blades slipping on the head of the child. It was, however, found to be useless, and sometimes injurious, by indenting, or even cutting the scalp. In Baudelocque's modification, this bead, or prominent line, does not appear.

In Dubois' forceps, (Plate XV., Fig. 82,) which is now much employed in France, the pelvic curve is greater, and the instrument much heavier. The

hooks at the extremities of the blades differ. One has the usual curvature of a blunt hook, but is connected with the handle by a screw, which, when removed, exhibits a trocar-pointed perforator. The other extremity is more curved, and, when its point is removed, it presents the appearance of a sharp crotchet. Dubois' instrument can, therefore, upon any emergency, be employed, not merely as a forceps, but also as a lever, a blunt hook, a perforator, and a crotchet. The whole instrument is, however, too heavy, and has all the disadvantages common to the French forceps.

The *German forceps* (Plate XV., Fig. 83) have short handles; in this respect they are analogous to the English forceps. Their joint is of the tenon and mortise character, generally with a screw pivot, while their blades and shanks closely resemble the French forceps. The blades have smaller fenestræ, but the pelvic curve is greater than in the forceps of Baudelocque, or, perhaps, even those of Dubois. Their cephalic curve is single, being nearly flat from one edge to the other.

Great discussions have existed as to the *relative advantage of the long or short forceps*. It is, indeed, of much importance.

There are a few facts, however, which will be generally acknowledged. Every variety of forceps must be regarded as exceedingly valuable, but much of the success of their employment depends upon the skill, judgment, and experience of the operator—a bad instrument being comparatively safe with one thus skilled, while a good instrument may prove very injurious, and even dangerous, in the hands of the uninstructed.

There can be no doubt, also, that at the inferior strait of the pelvis, it is a matter of minor importance what instrument should be used, and it is at this location that such artificial assistance is most frequently demanded.

Notwithstanding these allowances, we must give a decided preference to the French, or long, over the English, or short forceps. One important reason for this opinion is, that it is adapted to every emergency, equally applicable, whether the head be at the inferior or the superior strait, or in the cavity of the pelvis. Hence, there is no necessity for the practitioner to accustom himself to different instruments. In those rare and difficult cases, where the head is high up in the pelvis, he will operate with far more prospect of success, by employing an agent with whose use habit has made him familiar, than he would if obliged to resort to an agent, whose structure and whose power are to him comparatively new. Habit imparts facility and skill to an operator, and as the long forceps are fully equal to the short, at the inferior, and must be employed when the head is at the superior strait, it is best for the prac-

itioner to accustom himself, at all times, to the one instrument. Even when the head is in the cavity of the pelvis, the short forceps are hardly applicable, as the lock of the instrument will be so close to the vulva, as to endanger its tissues during the process of locking, or contuse them when traction is made.

Another advantage of the long forceps, as compared to the short forceps of Haighton, Davis, and most of those in general use, is the narrowness of the blade; this facilitates, not merely the entrance into the vagina, with little or no pain, or contusion to the mother, but will allow of the necessary manipulations in the cavity of the pelvis for their appropriate application.

Another advantage of the long forceps is their greater power. We shall presently mention that the influence of these forceps in delivery is not merely as tractors, but as levers, and hence the longer the instrument, the more powerful the leverage. The great power of the French forceps, from this cause, has been urged as an objection, but without proper consideration. Certainly, no man ought to apply the forceps who has not sufficient discretion to use no more force than is absolutely requisite for safe delivery; if, therefore, there is more power at command, he is not obliged to use it: while, on the contrary, if much power be demanded, he can, within the bounds of prudence, exercise it by the long forceps, but with the short forceps his efforts might be unavailing. Moreover, in cases of difficulty, the short forceps being used, the practitioner would be forced to make great muscular effort; while, with the long forceps, owing to their greater leverage, such effort will be comparatively trifling, and, of course, the whole force demanded can be much more delicately, and, at the same time, efficiently applied, and with more safety to the tissues of the child and its parent.

These considerations, we think, give a decided preponderance to the value of the French over all the varieties of the English and German forceps.

We have thus endeavored to specify the peculiarities, favorable and unfavorable, of the most approved forceps recommended by modern practitioners; they have their respective advantages and disadvantages. The powerful leverage of the long forceps, the facility with which they can be manipulated in the cavity of the pelvis, and their applicability to deliveries at the superior strait, so that the lives of many children can be preserved by their agency which would otherwise be sacrificed, are strong recommendations; while the greater breadth of the English forceps and the consequent large size of their openings, and also the double concavity of the cephalic curve, render the short forceps much safer to the tissues of the child. This

greater breadth, however, of the blades renders their introduction more painful, and manipulation with them in the cavity of the pelvis more difficult.

Thus Dr. Meigs acknowledges, when speaking of Davis' forceps, that in some instances the application of the second blade "is found to be difficult, dangerous, or impossible." Let it be remembered, also, that Dr. Davis, as we have already mentioned, does not regard his forceps as applicable to deliveries at the superior strait.

The author having, by experience, satisfied himself of the respective advantages and disadvantages of the forceps in common use, thought it possible that their excellencies might be combined in one instrument, and their defects avoided. This, with the assistance of the late Mr. John Rorer, the skilful and experienced surgical instrument-maker, of this city, he has endeavored to accomplish.

This modified instrument, (Plate XV., Fig. 84,) having now for nearly twenty-five years been employed by the author and his friends with much satisfaction, will, he believes, be found to embrace all the advantages, without the defects of the Baudelocque forceps. (Plate XV., Fig. 81.)

These defects, as already mentioned, are,
First. Its unnecessary weight.

Second. The pelvic curve is not sufficiently great. Hence, when the head is high in the pelvis, the perineum will be too much pressed upon, or else the blade will be applied in the direction of the occipito-frontal, instead of the occipito-mental diameter.

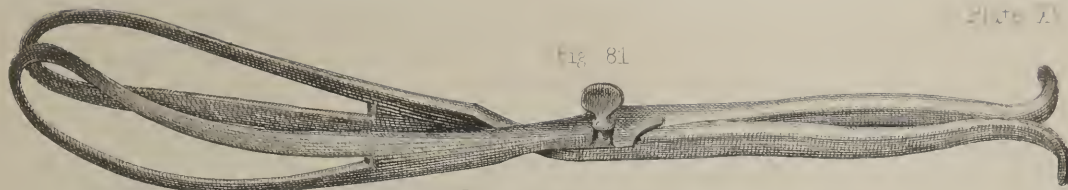
Third. The divergency of the blades, commencing at the joint, must necessarily distend the vulva (especially its posterior segment) prematurely, when the head is high up, and thus give pain and endanger the laceration of the perineum.

Fourth. The small size and "kite-like" shape of the fenestræ prevents any portion of the cranium projecting into the openings: hence, the hold on the head is less firm, and space is occupied by the blades, the thickness of which is added to the transverse diameter of the head.

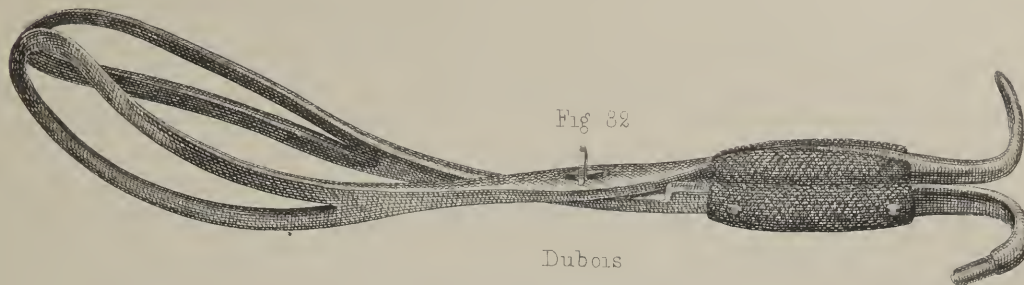
Fifth. The flatness of the internal or cephalic surface of the blades is such that the margin of the fenestra, often measuring three lines, is much thicker than the external edge of the blade, and increases the space occupied by the instrument. Hence, in cases of difficulty where compression is employed, contusion or even wounding of the scalp results.

Sixth. The lock of the French forceps is decidedly inferior to the English or German mode.

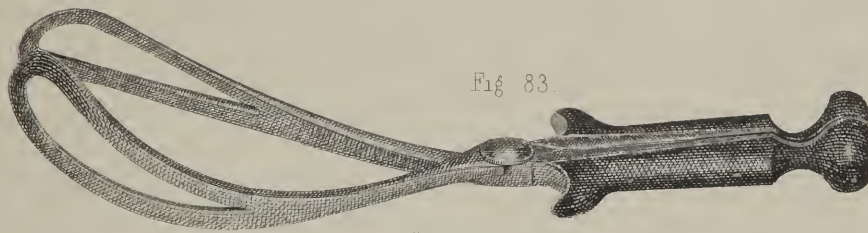
These disadvantages the author has endeavored to obviate, without diminishing or circumscribing the



Baudelocque's Forceps



Dubois



German Forceps



Hodge's

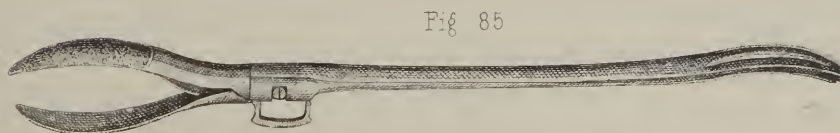


Fig. 85

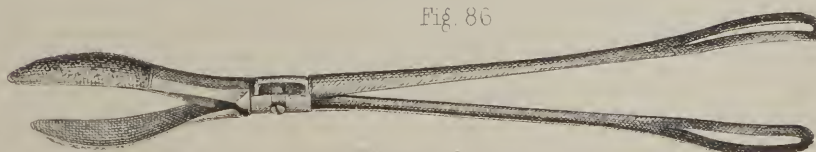


Fig. 86

Phoenix Forceps

utility of this most valuable instrument, to which the profession and the public have been so much indebted.

First. The weight of the instrument has been diminished from twenty-six ounces, *avoirdupois*, to seventeen ounces. Care should be taken while thus diminishing the weight of the forceps, that its strength be not impaired. The steel should be so well tempered and so firm that the blades will not yield or slip even when great compression is made.

Second. The pelvic curve is slightly increased, so that the perineum may not be dangerously pressed upon when the blades are in the axis of the superior strait. To counteract any loss of power which may ensue from this increased curvature, there is a bend in the handles in an opposite direction, that the direct line of traction may be preserved—a suggestion by Mr. Rorer.

Third. The shanks are nearly parallel, one being anterior to the other; they diverge no more than is absolutely necessary until they approximate the blades, where a more rapid curvature than in the French forceps occurs. This parallelism of the shanks prevents any undue pressure or stretching, and diminishes the liability to laceration of the perineum.

Fourth. The cephalic portions are nearly of the same breadth throughout, being equal to that of the extremity of the French forceps. The advantages of this greater breadth are the affording of a firmer hold of the head and allowing of larger fenestræ, so that the parietal protuberances may project into the openings, and no space be occupied by the blades when properly applied.

Fifth. The cephalic surface of the blades has a double concavity, as in Haighton's forceps, being curved not only from one extremity to the other, but also transversely from one edge to the opposite. Thus, a flat surface is always presented to the scalp, and there is no danger of this tissue being injured, even when great compression is made. The inner surface of the extremities which come in contact with the temple or face of the child, has been flattened, as had been done in Davis' forceps.

Sixth. The space between the blades corresponds to the ovoid shape of the head, the cephalic curve beginning moderately at the extremity of the blades, and gradually increasing for about two-thirds its length, and then diminishing more rapidly toward the shanks. Hence, when the handles are in contact, this space is very regularly oval; the greatest transverse diameter being about two-thirds of the length from the extremities, and measuring two and a half inches—the points of the instrument, at this time, being separated about six or eight lines. Hence, when the forceps are applied

to the head, and the handles, of course, partially separated, the parietal protuberances correspond to the greatest breadth of the forceps, while the anterior portions of the blade will be in very exact conformity to the lateral portions of the head. The advantages of this arrangement are very great; for when traction is made, the force is directed very equably upon the whole side of the head, anterior to the parietal protuberance, and not on any particular points; thus increasing the stability and efficiency as well as the comparative safety of the instrument. Another advantage is that the forceps with this curve are less liable to slip, for, when compression is made, the blades will glide nearer to the mental extremity of the head, just in proportion as the bi-parietal diameter is diminished by the lateral pressure. Thus, a small head will sink deeper into the grasp of the forceps than a larger; or, if a head should, from the necessity of the case, be perforated, and thus diminished in size, the forceps, by this arrangement, will be in no danger of slipping, but, on the contrary, would receive the head more completely within its grasp, as its diameters diminish.

Many practitioners have objected to all forceps which allow any great compression to be made on the head, recommending those in which the compression is limited. Thus, in Haighton's forceps, when the handles are closed, the greatest transverse diameter, from the exterior surface of one blade to that of the other, measures three inches. Hence, as portions of the head project into the fenestræ, and as the bi-parietal diameter measures but three inches and six lines, little or no injurious pressure can be made. This restriction, however, limits the use of the forceps, preventing their employment as compressors where there is a disproportion between the head and the pelvis.

The truth is, that some compression must always be made by the forceps, and the degree thereof must be regulated by the judgment of the practitioner, according to the necessities of the case. He will be justified, in many cases, where the passages are contracted, in augmenting the pressure, even to the risk of the child, inasmuch as the only alternative is craniotomy, while the forceps affords a reasonable prospect of preserving the infant.

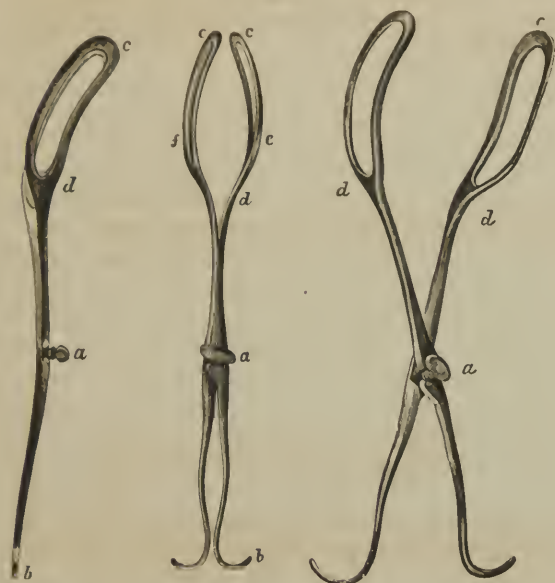
Seventh. The very ingenious and scientific mode of locking the blades, as in Siebold's forceps, by means of a conical pivot, and the corresponding oblique conical opening for its reception, is adopted, by which all the facilities of the English junction are enjoyed, and the security and firmness of the French joint maintained.

The forceps, as thus modified by the author, has the following measurements:—

The whole length of the instrument in a direct line

from *b* to *c* is sixteen inches. From the joint *a* to extremity *b*, the length of the handles is 6·8 inches. From *a* to *c*, extremities of the blades, is 9·5 inches, in a direct line. From *a* to *d*, length of the parallel shanks, is 3·5 inches. From *d* to *e*, the proper blades, in a direct line, is six inches. From *c* *c*, the extremities, to *e* *f*, the greatest breadth, is 3·7 inches.

Fig. 45.



Hodge's Forceps.

The separation between the points *c* *c*, when the handles are in contact, is ·5 of an inch. From *e* to *f*, the greatest breadth when the handles touch, is 2·5 inches; when the separation at *e* *f* is 3·5 inches, the points *c* *c* are separated two inches.

The breadth of the blade is 1·8 inches, slightly tapering to 1·7 inches near *c* *c*, the extremities. The breadth of the fenestra is 1·1 inches; the thickness of the blade is ·15 of an inch.

The perpendicular elevation of the points *c* *c*, when the instrument is on a horizontal surface, is 3·4 inches, which indicates the degree of curvature of the blades.

The elevation of the handles near the joint, above the same horizontal line, is 1·3 inches, (including the thickness of the blades,) which indicates the degree of curvature in the handles.

APPLICATION OF THE FORCEPS.—The patient may be placed either upon her *left side*, or upon her *back*. The English accoucheurs, who so generally recommend the short forceps, very universally apply them, when the patient is upon her side, having the limbs well sepa-

rated by a large pillow between the knees, or, what is much better, by the hands of an assistant. There can be no difficulty, after some experience, in applying the forceps and effecting delivery, under these circumstances. As a general observation, however, it presents many inconveniences, and even positive objections. The practitioner must continually remember that the position of the pelvis may be frequently altered according to the restlessness of the patient, as it is very easy for her, in this case, to incline more backward or forward at any moment; hence, a difficulty of bearing in mind the relations of the different parts of the pelvis, as regards the bed, and also as regards the position of the child. Some difficulty also is experienced in introducing the blades of the forceps, as the handles will be pressed against the thighs, unless the limbs be greatly flexed; the upper or right blade presents special difficulty, as the handle cannot be sufficiently depressed unless the patient's hips be brought close to the edge of the bed, or unless, as has been proposed, a hinge is placed in the handle, allowing it to be folded at the time of introduction.

This position will be found inconvenient, when the head is passing the orifice of the vagina, and the handles of the forceps are rising up in front of the pubis, for the practitioner to make traction effort, or, indeed, accurately to regulate the process of delivery, with safety to the tissues of the mother. There is also no opportunity of making any external examination with accuracy, if this should be desirable. Some practitioners, who are partial to this lateral position, at the commencement of the operation, nevertheless have changed the patient to the supine posture, as soon as the head distends the perineum. The chief supposed advantage of the position upon the side is, that the forceps can be readily directed in the axis of the superior strait of the pelvis. Hence, some practitioners, even when they use the long forceps, and the head be high up, prefer this posture, turning the patient afterward, as the head descends.

The position on the back, however, so generally resorted to by the Continental physicians, seems to us far preferable, in nearly all cases of operative midwifery. For, in such cases, the pelvis is firmly fixed upon the bed, on its broad posterior surface, so that there is no vacillation in its motions, and the practitioner has no difficulty, at any moment, in recognizing the relative position of the points of the pelvis with the head of the child. He and his assistants, have full command, also, of the external walls of the abdomen, either for the purposes of examination, or for rendering positive aid. The limbs of the patient, being abducted, do not, in any degree, interfere with

Fig. 87

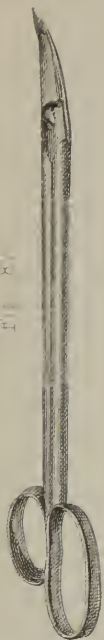
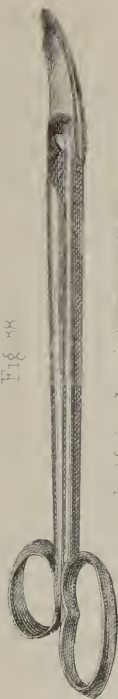
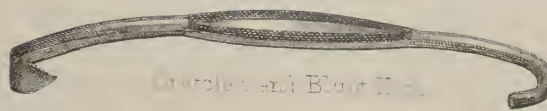


Fig. 88



Hodges' Craniotomy Scissors

Fig. 89



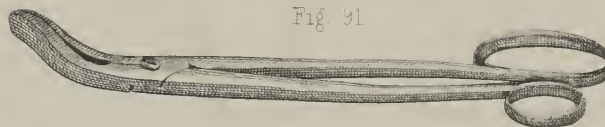
Guaranteed and Bland Hook

Fig. 90



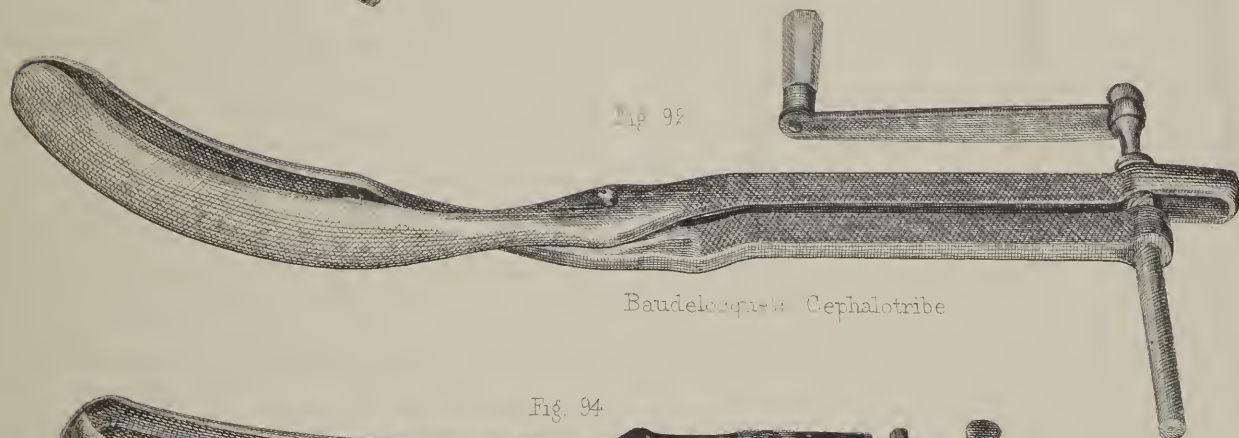
Guaranteed Craniotomy

Fig. 91



German Craniotomy Forceps

Fig. 92



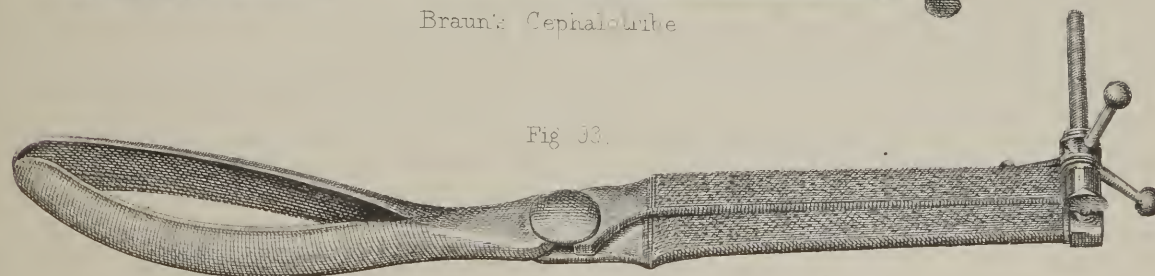
Baudeloque's Cephalotribe

Fig. 94



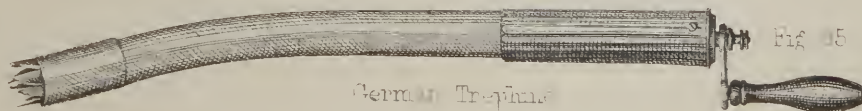
Braun's Cephalotribe

Fig. 93



Hodges' Compressores Crani

Fig. 95



German Trephine

the operator at any stage of the process, and allow full liberty for the ascent of the handles in front of the pubis, and every facility for the practitioner to regulate, with great precision, every manipulation requisite for the transit of the forceps and head of the child through the orifice of the vagina, so as to prevent injury to the tissues of the mother. He can readily hasten or retard the delivery, as well as support the perineum, as circumstances may demand. By bringing the patient's hip completely to the edge of the bed, and having her limbs supported by assistants, chairs, etc., there is no difficulty in passing the curved forceps in the axis of the superior strait, when the head is high up. When the head, however, is at the inferior strait, the patient may be allowed to maintain her feet on the bed, the limbs being much flexed, so that the hips may be a short distance from the edge of the bedstead, while the shoulders, and, sometimes, the pelvis, may be supported by pillows, so as to increase or favor flexion of the body.

Some practitioners, of late, have advised *complete* anæsthesia by ether or chloroform before using the forceps. To this practice we are decidedly opposed; for, as we shall hereafter mention, the forceps ought to be applied, and used without the consciousness of the patient, much less should they ever give her pain or uneasiness. Hence, anæsthesia is unnecessary, and it is all-important for the patient to retain her sensibility, so that the practitioner may instantaneously be advised by her exclamations, if any pain or irritation be excited. Of course, there can be no objection to the moderate inhalation of ether to quiet mental excitement, excessive nervousness, or inordinate pain, but it should not be carried to the extent of insensibility.

Suitable arrangements having been made, as already directed for instrumental operations, and the branches of the forceps, separated from each other, being immersed in a pitcher of warm water, the practitioner should again ascertain carefully the presentation and position of the head, and how far it has descended.

There are three important periods of delivery, during which the forceps are usually demanded, viz.: at the first, second, and third periods of the second stage of labor, that is, *first*, when the head is at the superior strait, or os uteri; *second*, in the cavity of the pelvis, rotation being incomplete; and, *third*, at the inferior strait, when rotation is nearly or quite perfected. It is at this last period that assistance is most frequently called for, and when such assistance can be rendered with the most facility. When the head is in the cavity of the pelvis, the application of the forceps is more difficult, and their use demands more attention; while, at

the superior strait, the difficulties and dangers have always been regarded as much greater—so much so, that strong prejudices have existed, and do still exist, especially among British practitioners, against the use of forceps at this first period of descent; often, therefore, deferring the application of the forceps as long as practicable, to the serious injury of the tissues of the mother and to the safety of the child, and even preferring craniotomy to the employment of the forceps. On the continent of Europe, where the long-bladed forceps has been so universally adopted, delivery at the superior strait is far more frequently executed, and the resort to craniotomy has been, therefore, less frequent than in the British isles. In this country opinion, of course, has been divided on the use of the long forceps, when the head is at the brim of the pelvis; it has, however, received great attention, and we cannot but believe that, as the mechanism of labor is more and more accurately studied, the facility and safety of this high operation will be more fully confirmed, and that practitioners will be convinced that not only will the lives of many children be thus preserved which would have been otherwise destroyed, but that the important tissues of the mother, so often contused and injured by the prolonged pressure of the head, may be preserved by a timely operation with the long forceps.

The correctness of this opinion will, we think, be apparent, by studying the *modus operandi* of the forceps, the peculiar circumstances in which they are applicable, and the results which have been attained by their employment. The following summary of copious statistics, as to the frequency with which this instrument has been used, seems to prove that just in proportion as practitioners have resorted to the forceps, the necessity of the fatal operation of craniotomy has been diminished. Dr. Churchill states the relative frequency of forceps cases among British, French, and German practitioners, as follows, viz.:

Among the British the forceps were applied in the proportion of one in every two hundred and forty-nine labors.

Among the French the proportion is one in one hundred and forty labors; and among the Germans, one in one hundred and six and a half.

We find, also, that Dr. Collins, of the Dublin Lying-in Hospital, employed the forceps once in every six hundred and seventeen labors; and Dr. Clarke, of the same institution, once in seven hundred and twenty-eight labors; while Dr. Siebold, of the Berlin Lying-in Hospital, operated with this instrument once in every *seven cases* nearly.

A general idea of the result of the different princi-

ples and practice thus evinced, as adopted by European accoucheurs, may be formed, by reference to the following table, which we copy from Dr. Robert Lee's Lectures on Midwifery:

Hospitals.	Number of Labors.	Forceps Cases.	Proportion.	Cranio-tomy Cases.	Proportion.
Dublin, Clarke, .	10,199	14	1 in 728	49	1 in 248
— Collins, .	16,654	27	1 in 617	118	1 in 141
Paris, Baudelocque,	17,888	31	1 in 561	6	1 in 2898
— La Chapelle,	22,243	76	1 in 293	12	1 in 1854
— Boivin, . .	20,617	96	1 in 214	16	1 in 1282
Vienna, Boer, . .	9,589	35	1 in 274	13	1 in 737
Ilstedberg, Nægelø	1,711	55	1 in 31	1	1 in 1711
Berlin, Kluge, . .	1,111	68	1 in 16	6	1 in 186
Dresden, Carus, .	2,549	184	1 in 14	9	1 in 283
Berlin, Siebold, .	2,093	300	1 in 7	1	1 in 2093

Left Occipito-Anterior Position.—To illustrate the application of the forceps, we shall begin with first position of the vertex, and the *third period* of descent, when the head has completed its rotation, and is arrested at the inferior strait of the pelvis. (Plate XVIII., Fig. 100, Plate VI., Fig. 44, and Plate XVII., Fig. 96.) It is at this period of delivery that the forceps are most frequently demanded, and their application and employment are most easily effected. In this case, it should be borne in mind that the bi-parietal diameter corresponds to the transverse of the inferior strait, and the occipito-mental to its axis; and also that the blades of the forceps should therefore be applied, as accurately as possible, parallel to this occipito-mental diameter, and should extend over the sides of the head from the occiput toward the chin. The occipital protuberances will then project into the fenestræ of the forceps, and the bi-parietal diameter will, of course, be received between the blades of the instrument.

The patient, therefore, being properly placed, the practitioner should take the male or left branch of the forceps in his left hand, and, after anointing the cephalic portion, and also the fingers of his right hand, should hold the instrument obliquely, so that the handle should be elevated over the right groin, and be brought into such a position that the extremity of the blade is parallel to the long diameter of the vulva. Two or three fingers of the right hand should now separate the labia, and receive the convexity of the blade upon their palmar surface, while the concavity of the blade should be brought into close contact with the surface of the head, by giving a little obliquity to the blade, and keeping the handle sufficiently elevated. The point of the instrument will now be found upon the left and posterior portion of the vulva, from which it is protected by the fingers of the

practitioner. The blade is now to be slowly passed, during the absence of a pain, along the side of the child's head, keeping the *concavity of the instrument* in close approximation to the *convexity of the head*. This rule we think preferable to the one usually given, of keeping the point of the instrument close to the head of the child, as thus the practitioner is often induced to press the point too firmly, so that it may be obstructed by a fold of the scalp, or by the projecting portion of the ear, while if the concave portion of the whole blade, including that of its extremity, be kept in contact with the head, this difficulty will be less apt to occur. This passage of the blade is effected by depressing the handle of the instrument in an oblique direction, from right to left, from its original position over the thigh of the mother, at the same time giving it a spiral turn or twist, so that eventually the handle will be found projecting parallel to the axis of the inferior strait; the hook-like extremity being horizontal, and the pivot perpendicular, when the woman is supine.

This passage of the blade should be slow, and without force, which is never requisite, the instrument readily gliding close to the head, and receiving no impediment from the vagina, now distended and smooth. The fingers should be used as a guide to the blade, as far as they can conveniently be introduced; but the point of the instrument will soon project beyond their extremities, and care must, of course, be taken to depress the handle so rapidly that the point of the instrument will not impinge against the vagina in any portion of its course; but if the depression of the handle be too rapid, it would cause the point to impinge against the tissues of the child. By a little attention, the blade can thus be passed, not only without exciting pain, but without even the consciousness of the mother. Of course, there is no excuse for any injury or contusion to the child or its parent.

The male or left branch being thus introduced, may be given, if necessary, to an assistant, to support it in its proper position; this, however, is rarely demanded, as the pressure of the head against the blade is sufficient for the support of the instrument. The right, or female branch, must be taken in the right hand of the practitioner, and held in an oblique direction over the left groin of the mother, while the fingers of the left hand should receive the convexity of the extremity of the blade on their palmar surface, and by them be directed to the right posterior portion of the vulva. It will be found, in this case, more convenient to carry the handle of the instrument rather nearer to the pubis, in order that the extremity of the blade may be directed nearer to the perineal commissure of the vulva,



Fig. 96.

1st position of Vertex
Forceps at Inferior Strait



Fig. 98

Forceps in Cavity of Pelvis



Fig. 97.

Head delivered.

and in contact with the upper and posterior portion of the right parietal region, as, in this way, it enters more readily within the vulva, which is now partially occupied with the first blade pressing the head more closely to the right ramus of the ischium, and thus, also, there is less danger of giving pain at the orifice of the vagina. The blade is now to be passed in the same manner as the male blade, using the fingers as a director, depressing the handle obliquely from left to right, and giving, at the same time, more of a spiral motion, so that the blade, originally introduced into contact with the upper portion of the head, will gradually revolve to the side, in the direction of the occipito-mental diameter, and receive the right parietal protuberance into the fenestra. This being carefully accomplished, the handle will be found projecting, like its fellow, in the direction of the axis of the inferior strait, with the hook-like extremity horizontal, and the mortise of the female branch will be opposed to the pivot, and the two flat articular surfaces at the joint will be formed parallel and upon the same level, indicating a corresponding parallelism of the blades upon the sides of the child's head. The turn of the screw pivot, by means of the thumb-piece, renders the joint firm, and prevents the possibility of any subsequent derangement of the blades.

In thus applying the instrument, the practitioner should allow himself sufficient time, and, by careful attention to the rules mentioned, especially after a little experience, he can introduce the instrument without exciting the consciousness of the patient; although, from the apprehension necessarily associated with an instrumental operation, timid patients will often attribute the necessary sufferings of labor to the forceps.

The operation should be conducted during the absence of the expulsive effort. There may be exceptions to this rule, but if the blade be ever passed during a bearing-down effort, more care will be requisite to give a proper direction to the point of the instrument, so as not to injure the vagina of the mother or scalp of the child. After the instrument has been adjusted, the handles, during the absence of a pain, are to be gently approximated, so that the practitioner may be satisfied that a firm grasp is made on the head, and, at the same time, that no portion of the tissues of the mother are involved; in this latter case, pain would be excited, while usually, by this pressure, no sensation would be produced.

The application of the forceps in the *second period*, when the head is in the cavity of the pelvis, (Plate VI., Fig. 43, and Plate XVII., Fig. 98,) and where rotation is not perfected, must be conducted upon the

same principles as in the former case. Some peculiar attentions, however, are demanded, arising from the oblique position of the head, and its greater distance from the vulva. The rule here should be, as in the former case, to direct the blades to the sides of the head, notwithstanding the obliquity of its position.

The practice which has been recommended, especially by the German accoucheurs, to direct the blades of the forceps to the sides of the pelvis in all cases, irrespective of the obliquity of the head, cannot be defended on scientific principles. In this case, for example, the blades would strike upon the side of the occiput and os frontis, while the points of the instrument would project below the occiput on one side, and beyond the os frontis upon the opposite, and might thus do mischief to the opposing tissues of the child or parent, and when compression is made by the forceps, a forced rotation will be given to the head within the grasp of the forceps, with some danger to the tissues of the scalp. Although it may be proper, on some extraordinary occasions, to apply the forceps in this oblique direction to the child's head, yet, certainly, it ought not to be done, for reasons just mentioned, except in cases of absolute necessity.

In this second period of labor, therefore, as the head is oblique, the forceps, when adjusted, should have a corresponding obliquity in its direction. The male branch is here, also, to be introduced first, as the subsequent locking of the instrument will be easy, the female branch being above: but if, as directed by Madame Lachapelle, the female branch should be introduced first, because its introduction is more difficult, then the locking could not be effected without causing the blades to pass one another; for the male branch, after being introduced, will be found in front, and not below or behind the female branch.

The practitioner should hold the male branch in an oblique position, in the left hand, over the right thigh, but not so elevated toward the groin as formerly directed; while the fingers of the right hand, protecting the vulva, should carry the point of the instrument to the left posterior portion of the vagina, so that it may pass over the top of the child's head—the region of the posterior fontanel—and the handle of the instrument should be very rapidly depressed, in order that the extremity of the blade should be kept in contact with the side of the head, over which it now passes in an oblique direction from the vertex toward the temple and face. The handle also, as it is depressed, should be carried with a semi-spiral motion downward and outward toward the left thigh of the mother; the depression of the handle must be much greater toward the perineum than in the

former case, rendering it necessary to bring the nates of the patient close to the edge of the bed. By the semi-spiral motion given to the handle of the forceps, the blade is made to revolve from the top to the side of the head over the parietal protuberance. The branch will now be oblique, corresponding to the left thigh of the mother, and the blade corresponding to the left side of the head. Hence, the pivot will no longer be perpendicular, but oblique, pointing toward the left groin. This branch may now be delivered, if necessary, to an assistant.

The right or female branch must now be introduced to the opposite side. The handle being held by the right hand of the practitioner over the left thigh, and the fingers of the right hand acting as a protector to the soft parts of the mother and as a director to the extremity of the blade, the cephalic curve will be brought in contact with the vertex, and the whole blade should be made to pass obliquely over the top of the head to the right temple, by rapid depression of the handle, and by giving it the spiral curve formerly directed, so as to bring the instrument completely from the top to the side of the head. The degree of this spiral curve or twist must be much greater than in the cases before designated, and constitutes sometimes the most difficult part of the forceps operation. The difficulty is very frequently increased by the firm pressure of the right parietal protuberance against the right ramus of the ischium or pubis, rendering it not only difficult but not always safe to the tissues of the mother or child, to direct even the thin edge of the forceps over the parietal protuberance. This, however, can generally be accomplished by passing the instrument slowly; the right hand of the practitioner acting upon the hook at the extremity of the handle while the fingers of the left hand are pressing the curved edge of the blade upward, so that by their combined operation the whole blade of the instrument is made to revolve gradually over the side of the head between the ramus of the pubis and the parietal protuberance.

The directions now given for the transit of the female blade over the top of the head, and then by a spiral movement to its side, are virtually the same as that proposed by Madame Lachapelle, and generally followed by the French accoucheurs, as Baude-locque, Velpeau, Cazeaux, etc. She directs the blade to be passed into the vagina toward the left sacro-sciatic foramen, and then by depressing and twisting it, to carry the point along the plane of the ischium toward the right cotyloid cavity. We think, however, the practitioner will do better by bearing in mind the relative positions of the blade with the head of the child rather than the walls of the pelvis, espe-

cially as the degree of obliquity of the head varies in different cases.

Should any special difficulty exist from the firm impaction of the head against the ramus of the pubis, the practitioner should push back the head of the child, during the absence of a pain, so as to gain more room for the transit of the blade over the parietal boss. This being accomplished, the handle of this right branch will be found depressed and oblique, corresponding to its fellow. The flat surfaces at the joint will again be parallel to each other, and the locking of the instrument will be readily accomplished; the instrument is now oblique, corresponding to the obliquity of the head, the pivot pointing to the left of the mother.

The application of the forceps, under these circumstances, the author considers as practically more difficult than even at the superior strait of the pelvis. The male blade generally passes readily: nevertheless, it is occasionally resisted by the close approximation of the side of the head to the promontory of the sacrum, or, it may be, by the shoulder of the child, unusually depressed by the expulsive efforts, while the head is retained in the pelvis. In such cases no force should be employed, but the blade may be partially retracted, and a different direction be given to it by depressing or elevating the handle, and, at the same time, the cephalic curve should be carefully brought into contact with the convexities of the head. It is, however, the introduction of the ~~left~~ branch, which is specially difficult, arising from the necessity of directing the blade of the instrument deep into the cavity of the pelvis over the top of the head and toward the right sacro-iliac symphysis, and the consequent need of causing the instrument to revolve from the top to the side of the head in a confined space, and where the head of the child is pressing firmly on the pelvic tissues.

By the measures already indicated, this revolution of the blade over the parietal protuberance and side of the head can be accomplished, so that the process of locking may be very easy, and the blade be parallel to the occipito-mental diameter of the head. If there should be any difficulty, no force should be employed, but by retracting the instrument partially, a different direction will be given to it, especially upon receiving its spiral motion and depressing sufficiently the handle, so as to bring the blade nearer the axis of the superior strait of the pelvis. If the handles do not lock readily, the junction can be effected by depressing both handles and carefully examining that each blade is introduced to the same depth into the cavity of the pelvis, and that the flat surfaces connected with the pivot and

mortise are brought parallel to each other. In some instances, however, it will be found that the blades correspond to the direction of the occipito-frontal diameter of the head, rather than to the occipito-mental.

The application of the forceps in the *first period* is when the head is at the superior strait of the pelvis, (Plate V., Fig. 42, and Plate XVIII., Fig. 99,) with the base of the occiput toward the left acetabulum, and the anterior fontanel at the right sacro-iliac symphysis. The necessity for the forceps, under these circumstances, must, of course, be rare; in most cases it presupposes a disproportion between the size of the head and that of the straits of the pelvis. We shall take it for granted that the labor has continued for some time, and the expulsive efforts have been sufficient to complete the flexion of the head; but that the head does not advance either from its comparatively large size or from the deficiency of uterine power. Sometimes the head will be fairly engaged in the strait, and its parietal protuberances at the linea ilio-pectinea; while in other instances, these protuberances have not fairly entered the strait, but are still above the brim; almost universally, however, the head has been fixed in one position by the contractions of the uterus. Authors speak of applying the forceps when the head is movable above the superior strait; by which expression may be included the cases just alluded to where the parietal protuberances are above the level of the linea ilio-pectinea; but it can hardly be supposed to embrace cases in which the head is strictly *movable* in the superior pelvis, readily to be pushed in any direction, as this implies great inertia of the uterus, demanding special attention.

When the head is fixed, however, at or near the superior strait, we have already indicated our preference for the forceps to the operation of podalic version to accomplish a safe delivery; believing that a judicious use of the long forceps will be unattended with special difficulty or danger, and the life of the child will be less jeopardized, especially when there is a disproportion between the head and the pelvis.

In operating in such a case, the point of the left or male blade is to be directed toward the left sacro-iliac ligament by the fingers of the right hand, or, it may be, by the whole hand carried as far as practicable over the head of the child toward the edges of the os uteri. The handle should then be depressed very rapidly toward the left thigh, so as to cause the point of the instrument to ascend to the left side of the head over the parietal protuberance. Great caution is requisite to ensure the passage of the blade within the os uteri, which can generally be readily accomplished through the assistance of the finger, extended to this orifice; but even

if the edges of the os cannot be felt, nevertheless, by keeping the point of the blade closely approximated to the head, no real difficulty will ensue. No force should ever be employed, as the blade ought to slide easily over the whole side of the head into the uterus.

No serious difficulty ought to follow from the prominence of the sacrum, as the parietal protuberance over which the blade first passes is upon one side of the promontory, and then, by depressing the handle sufficiently, and thus keeping the point of the instrument close to the head of the child, there will be plenty of room for the thin blade of the forceps to pass over the side of the head.

The blade being thus introduced, the pivot will be close to the left labium, and, if the patient be very corpulent, it may be even in contact. It will be, of course, oblique, pointing to the left groin; the shank of the instrument being close to the left side of the perineum, and the handle depressed obliquely toward the left thigh of the mother; the nates of the patient must be at the edge of the bed, to allow of the depression of the handle.

The right or female branch is now to be taken in the right hand, and the handle held obliquely over the left thigh, while the blade is to be carried by the fingers of the left hand deep into the pelvis, and over the top of the head of the child, inclining it to the right or pubic side. This is accomplished by a rapid depression of the handle toward the perineum. As soon as the point of the instrument approximates the forehead of the child, the practitioner should grasp the hook-like extremity of the handle, by means of which, assisted by the fingers of the left hand acting upon the convex edge of the forceps in the cavity of the pelvis, the blade is made to revolve from the top to the side of the head over the parietal protuberance. The effect of this spiral motion given to the instrument is facilitated by continuing to depress the handle, and carefully pushing the point of the blade to the temple and face of the child. To perform this part of the operation, the same attention should be paid as when introducing the male blade to secure the entrance of the point of the blade into the uterus without impinging against the os uteri.

The above is, we think, the best rule for the application of the blades. If, however, the instrument is to be guided with reference to the pelvis, rather than the head of the child, we would say that the female blade should be at once directed from the orifice of the vagina to the right plane of the ischium, along which it should traverse, the point being carried behind the acetabulum, close to the head of the child, and a spiral movement being given to the branch by depressing the handle externally, and acting upon the convex edge

of the blade, by the fingers of the left hand within the pelvis. Madame Lachapelle seems to doubt whether at the superior strait the spiral movement can be communicated to the instrument. We think, however, that there will be no real difficulty, provided the point is directed, not toward the sacro-sciatic ligament, but immediately to the side of the pelvis; in other words, over the superior and right portion of the child's head. Should there be much difficulty in getting the blades to correspond exactly to the occipito-mental diameter, there will be no objection to embracing the head obliquely upon the side of the occiput, and that of the os frontis. (Plate XX., Fig. 108.)

The blade being fairly brought to the side of the head, the handle will be found oblique, like its fellow, toward the left thigh of the mother, and the flat surfaces at the joint being parallel, the lock of the instrument can be readily effected. Should any trouble occur, one or the other blade must have its position rectified, until a proper parallelism is effected, so that no force may be requisite in locking the instrument. This being accomplished, a slight compression of the handles, assisted by an examination by the finger at the os uteri, will enable the practitioner to satisfy himself that no part of the mother's tissues, especially the os uteri, are within the grasp of the forceps.

It has been already intimated that, although the application of the forceps under these circumstances is not as easy as at the inferior strait of the pelvis, yet, in our opinion, it can as readily be accomplished as when the head is in the cavity of the pelvis with the parietal protuberance pressing against the ramus of the pubis; for here at the brim there is more room for the passage of the blade over the side of the head. The only real additional dangers of the high operation are that the os uteri is involved, and the blades of the forceps are within the uterus, and hence, as the head descends, there will be more liability to contusion of the tissues of this organ. But as these dangers can generally be obviated by careful attention, even in cases of contracted pelvis, we must think that this operation is defensible wherever there is hope of preserving the child's life, rather than endangering it still more by version by the feet, or by ensuring its destruction by the terrible operation of embryotomy. That great mischief has resulted from wounding or perforating the vagina, by bruising or lacerating the os uteri, and even the bladder, in forceps operations, there can be no doubt; but the abuses of a valuable instrument by the careless or ignorant should not be presented as arguments against its prudent and scientific employment.

Right Occipito-Anterior Position.—The use of the forceps in the second position of a vertex presentation,

at the inferior strait, in the cavity of the pelvis, or at the superior strait, is to be conducted upon the same principles.

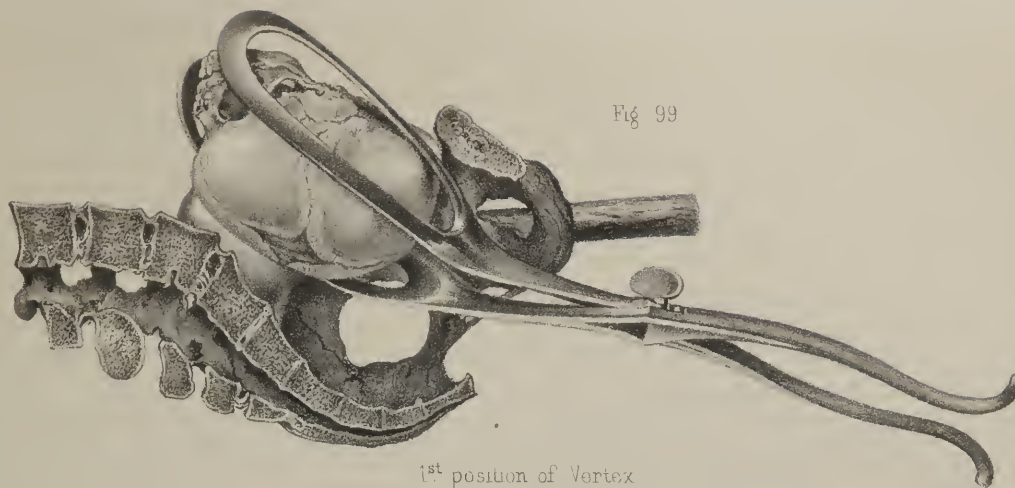
Of course, at the *inferior strait* of the pelvis, the operation must be precisely the same. (Plate VI., Fig. 44, Plate XVII., Fig. 96, and Plate XVIII., Fig. 100.)

At the *second period* of labor, however, where the head is in the cavity of the pelvis, (Plate VIII., Fig. 51,) with the occiput toward the right anterior inclined plane, it is manifest that when the forceps are applied, the male blade on the left side of the head will be toward the anterior and left of the pelvis; and in this case it is, therefore, called the pubic blade. Of course, its application to the head of the child involves peculiar difficulties, already detailed in speaking of applying the female blade in the first position, between the parietal protuberance and the ramus of the pubis; which difficulty may be surmounted in the manner there detailed.

The only question to be decided in this second position of the vertex is, which blade is to be introduced first into the cavity of the pelvis. The general rule laid down by practitioners is, that the sacral blade should usually be introduced primarily, and, subsequently, the pubic blade; but in all those cases, where the occiput is upon the right side of the pelvis, and where, of course, the female blade will be posterior or sacral, it follows that, if it be first introduced, the handle of the male blade, then pubic, will descend in front of the female blade, so that the locking of the instrument will be exceedingly difficult, necessitating the separation of the handles in a lateral direction, or, perhaps, even the removal of the pivot, so as to allow the male blade to be depressed sufficiently, under its fellow, to permit their junction. On this account, it seems far preferable, in all such cases, to introduce the pubic blade first, so that the locking may occur without difficulty. In other words, the best general rule is, always to introduce first the male blade, whether it shall pass to the pubic or sacral portion of the pelvis.

The rule laid down by Madame Lachapelle, whose authority is very great, is to introduce that blade first which is the most difficult, without respect to whether it be toward the pubis or sacrum. Hence, according to this rule, the pubic branch will generally be first employed. While Velpeau, Cazeaux, and others direct that the sacral blade should always be introduced first. We can perceive no good reason why either of these rules should be universally followed, while it is all-important to avoid any difficulty in locking the instruments; we greatly prefer the primary introduction of the male blade in all operations of the forceps.

Fig 99



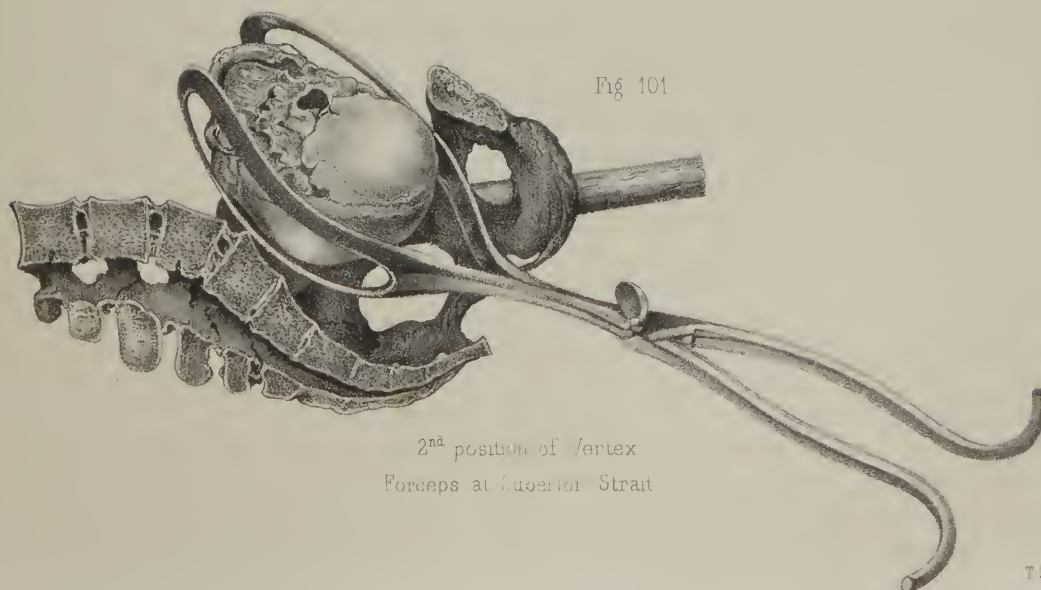
1st position of Vertex
Forceps at Superior Strait

Fig 100



Forceps at Inferior Strait

Fig 101



2nd position of Vertex
Forceps at Superior Strait

Occipito-Pubic Position.—In this position, where the base of the occiput is toward the pubis, (Plate VIII., Fig. 52, and Plate XIX., Fig. 102,) during each period of labor, no peculiar attention is demanded; for at each period, the blades of the forceps, applied to the sides of the child's head, will correspond also to the lateral portions of the pelvis, and, of course, the pivot will be, in each case, directly forward. The direction of the instrument, as regards the axis of the pelvis, must, of course, vary according to the location of the head, whether it be high up or low down in the pelvis.

Right Occipito-Posterior Position.—In the fourth position of the vertex, when the occiput is posterior, the use of the forceps will be attended with considerable difficulty; and, as will be hereafter mentioned, it will be very seldom required, especially as such position of the vertex can generally be changed into a second position previous to the application of the forceps. Still, however, the forceps may be demanded in the fourth position, when the head is at the inferior strait, or in the cavity of the pelvis.

First, then, at the *inferior strait* of the pelvis, (Plate IX., Fig. 55, and Plate XIX., Fig. 104,) where the top of the forehead is behind the pubis, and the occiput toward the coccyx, since the convex edge of the forceps must always be toward the posterior part of the pelvis, it follows that when the blades are parallel to the occipito-mental diameter of the head in this case, the convex edge of the forceps will have respect to the base of the cranium and the concave edge to the sinciput, or top of the head, the reverse of what occurs in the occipito-anterior positions. The general rules for the application of the forceps, in this case, does not essentially differ from those proper for anterior positions. It must be borne in mind, however, that, as the occiput is now far back toward the coccyx, the nates of the patient must be brought completely to the edge of the bed, that the handles of the forceps can be carried far back against the perineum, so that the blades may correspond to the occipito-mental diameter of the head. Hence, in this position, the pivot will be directed forward, while the shanks of the instrument, being depressed, will approximate the axis of the superior strait.

In the *second period*, when the head is in the cavity of the pelvis, (Plate IX., Fig. 54,) and the top of the forehead toward the left anterior inclined plane, the handles of the forceps, when suitably applied, will be depressed obliquely toward the left thigh, the pivot, of course, pointing to the left groin. In this case there may be some trouble in introducing the right or female blade over the side of the head, owing to the

pressure of the left parietal protuberance against the ischium. Still, however, there will be no special difficulty which cannot be obviated, as directed for the first position of the vertex, when the head is arrested during the second period of labor. In this fourth position, when oblique, the right or female blade must be passed over the vertex toward the left side of the occiput, when a very rapid depression of the handle, giving it, at the same time, a spiral movement, will direct the concavity of the blade from the occiput over the ear and side of the head; this rapid depression of the handle becomes requisite, owing to the great convexity of the posterior portion of the head. The points of the fingers must always guide the extremity of the blade, and give assistance to the spiral movement just mentioned.

Left Occipito-Posterior Position.—In the fifth position of the vertex, (Plate X., Fig. 59,) the male blade, although it is now pubic, must be passed over the right side of the head, agreeably to the same rules; and then the female blade, now sacral, must be passed to the opposite side, and in this case, junction being accomplished, the handles will be obliquely depressed toward the right thigh of the mother.

Occipito-Sacral Position.—In the sixth position, (Plate X., Fig. 60,) where the occiput is posterior, or sacral, during the different periods of descent, the blades will correspond to the sides of the pelvis, and the pivot will point directly anteriorly, while the depression of the handles must be great, even when the occiput is at the inferior strait and the posterior perineum.

In all these *occipito-posterior positions* the blades of the forceps, when applied to the occipito-mental diameter, will press firmly against the perineum, and hence, in first labors, it may be difficult to carry them sufficiently far back to effect the above object; and the direction of the blades will necessarily be oblique upon the sides of the head from the vertex toward the angles of the jaw, rather than toward its chin. Nevertheless, if the parietal protuberances completely enter the fenestræ of the blades, a firm hold will be maintained on the cranium.

MODUS OPERANDI OF THE FORCEPS.—The forceps being properly applied to the head, may be used as Compressors, as Tractors, and as Levers.

First, then, as *Compressors*. By grasping the handles of the instrument the blades are approximated more and more closely to the sides of the head, and some compression is necessarily made upon its tissues. In ordinary cases of instrumental labor this compression is very trifling, being carried simply to the extent

demanding to fix the blades firmly upon the head of the child, so as to prevent, while acting with the instrument, any motion of the blades upon the scalp—the blades and the head should be considered as one body; their movements must be simultaneous. This idea we think important, for otherwise the blades with their fenestræ would move upon the head, endangering the integrity of the tissues. The degree of compression beyond the point just indicated, must be regulated by the necessities of the case and the judgment of the operator. If the head be large or the straits contracted, more pressure becomes requisite; otherwise delivery would be impracticable. How far this compression may be carried with safety to the infant, is a question of great interest: but the solution of it cannot have much influence on our practice, inasmuch as we must be regulated not so much by the idea how much compression can be borne with impunity, but how much is absolutely demanded to accomplish the delivery; for, of course, no more pressure should be made than what is essential for delivery.

It is to be remembered, also, that the injury to the child depends much upon the longer or shorter continuance of this compression, and also, doubtless, on the degree of ossification which may exist in the cranial bones. Moreover, every practitioner is familiar with the wonderful fact, that while the placental functions continue, the brain will bear, for a long time, great pressure with impunity. Baudelocque and others have endeavored to ascertain, by experiments with the forceps on a dead fœtus at term, what diminution can be effected in the length of the bi-parietal diameter, and have come to the conclusion that the diminution of four lines is all that can usually be accomplished,—sometimes it may extend to six lines, but this is not considered compatible with safety to the living fœtus. Such experiments cannot be satisfactory, as the degree of ossification varies in every case, and cannot be fully determined during labor. We know that, owing to the moulding of the head by the passages of the pelvis, and of powerful contractions of the uterus, the head may be greatly diminished laterally, and increased in length by the yielding and overlapping of the bones, in many instances, without destroying life; and we know also that in many cases where such compression has existed, forceps have effected a delivery and the child been preserved. In one case of contracted pelvis, where the sacro-pubic diameter measured but little if any more than three inches, the author delivered an infant alive, whose head a few hours after delivery measured three inches and ten lines in its transverse diameter.

We think, therefore, that the limit to be prescribed

to the use of the forceps as compressors must be restrained by the necessities of the case, rather than by the effect it may have upon the life of the infant; for though that practitioner must be regarded as careless and even criminal who makes more compression than is absolutely necessary, yet he is fully justified in making that degree of compression requisite to effect delivery, provided there be any reasonable expectation of preserving the life of the child. The high authority of Dr. Dewees sustains us in the opinions just expressed. He observes that compression should be proportioned to the necessities of the case, the more moderate the better for the child—the greater the pressure, the more danger to the child.

If, however, the deformity be great—less than three inches in the short diameter precluding the idea that a living child can be born—craniotomy must be preferred, for the safety of the mother's tissues, and even of her life.

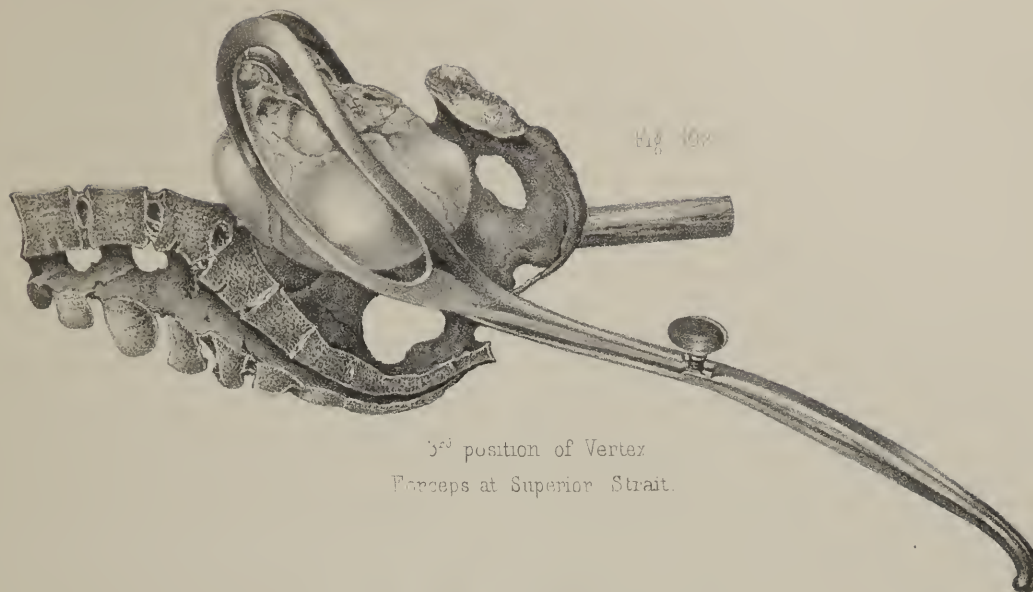
Although, therefore, the child must, in many instances, be exposed to some danger from the use of forceps as compressors, yet they afford a fair prospect for its safety in bad cases, where otherwise it must have perished; and, in most instances, they are all-important to diminish the sufferings and danger of the parent, with little or no risk to their infant.

Doubtless, much mischief has been produced by inordinate and unnecessary compression with the forceps, and therefore the caution urgently given by many writers, not to use the forceps as compressors, should not be disregarded: but it is not wise, we think, to carry this caution so far as to deprive the practitioner of the great benefit resulting from moderate compression of the head in cases of difficult labor; neither is it advisable to endeavor, as we have formerly mentioned, to prevent the possibility of undue compression by the form of the instrument. The forceps ought to be so constructed that the blades may be approximated sufficiently to insure a degree of compression requisite for delivery.

Let it also be remembered that the pressure made on the head by the forceps, diminishes that made by the head on the tissues of the pelvis, and thus contributes to their integrity and safety.

Second, as *Tractors*.—The blades of the forceps being fixed by a slight degree of compression upon the head of the child, traction may be made downward in the direction of the axis of the obstetric canal. (Plate V., Fig. 39.)

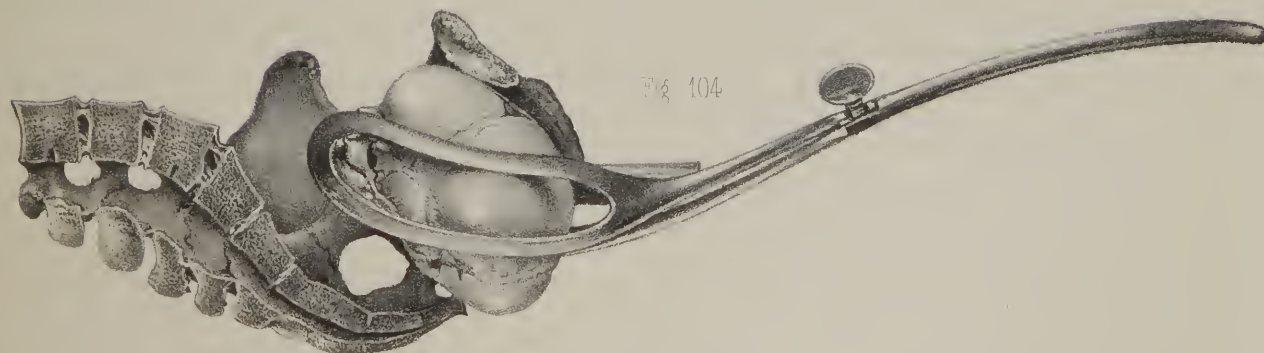
The mode of grasping the forceps must be left to the convenience and judgment of the operator. Velpeau, Cazeaux, and others, direct that at the commencement of the operation, the right hand should



3rd position of Vertex
Forceps at Superior Strait.



4th position of Vertex
Vertex in Cavity of Pelvis



4th position of Vertex
Forceps at Inferior Strait

be placed in front of the handles near its curved extremities, and the left hand underneath on the shanks, and in front of the joint; as the head extends in front of the pubis, the direction of the hands should be reversed—the left hand being placed over the shanks in front of the joint, and the right hand underneath. This may answer as a general rule; but, while the practitioner always keeps his right hand on the handles, the left may be variously employed, sometimes in front of the shanks, so as to depress the whole head toward the coccyx and perineum, then, again, the fingers may be applied to the head of the child to watch its progress, and eventually to the perineum, so as to prevent mischief from laceration, etc., at the time of birth. This last we prefer doing ourselves than trusting to any assistant.

Great power, by this simple traction effort, can thus be exercised, and it is often sufficient, even without the assistance of any expulsive effort of the mother, to effect delivery. Care should be taken, when traction is employed, that the blades are so firmly pressed against the sides of the head, as not to slip or even move upon the scalp; as in either case much mischief might result. Hence, traction should always be combined with a certain degree of compression, and then there can be no danger of injuring either the tissues of the child or parent, by using the forceps as tractors.

Third, as *Levers*.—Either blade of the forceps, if separately applied to the head, may readily perform the duty of a lever, to be used precisely in the same manner already directed in the use of that instrument, and by many, therefore, has been substituted for it. Hence, when both blades are applied to the child's head, the forceps may be regarded as a double lever of the "first kind." The lock may be regarded as the common fulcrum to each branch when used as a lever.

When the instrument is applied to the child's head, at the inferior strait, while a moderate degree of compression and traction is made, the handles of the instrument may be carried very slowly from one side to the other. This lateral motion, first toward one thigh and then toward the other, gives great efficiency to the forceps, the branches acting alternately upon the opposite sides of the head very powerfully as levers. Every one is familiar with the great efficacy of this mechanical agent; and it is manifest that the longer the instrument, the greater its leverage. Although this has been urged as an objection against the long or French forceps, it is manifestly a great recommendation: the practitioner may, by a gentle motion of the hand, easily accomplish what would otherwise demand great muscular effort, and therefore the requisite degree of

power may be applied and regulated with great precision; while, on the other hand, it would be very reprehensible if, because the instrument is powerful, he should apply more force than the case demands. His judgment must be exercised in regulating the force so as to graduate it to the emergencies of the case.

In using the forceps as levers, the accoucheur should be careful to make that degree of compression which would keep the blades in close contact with the head, so that there should be no motion on the scalp during the pendulum-like motion of the forceps. This rule is necessary, not merely for the safety of the scalp, but, also, for the efficiency of the instrument; for, if the forceps glide upon the head, comparatively little effect is produced by their action. For a similar reason, the lateral motion of the forceps should be very slowly performed, and to a limited extent, inasmuch as every motion of the handles produces a corresponding motion of the head in the vagina, where it is already closely impacted; and hence, if rapidly turned to one side or the other, the head of the child, and especially the tissues of the mother, may be greatly injured. Indeed, it would seem to be impossible that the head could vibrate as rapidly as some practitioners are in the habit of moving the blades of the forceps, and such hasty motions would necessitate a movement of the blades on the scalp of the child to its great injury, and endanger also the tissues of the mother. Although the forceps acts as a double lever, yet it is far more safe in its operation than the single lever; because there is no danger of its slipping, since the blades retain the same position on the sides of the head, and the soft parts of the mother will never become a fulcrum: the lock constitutes a movable fulcrum.

Such are the powers which can be exercised by the forceps, rendering it so valuable, and securing the safety of the mother and her infant in cases of tedious and difficult labors. To illustrate its operation in a few more particulars, let us suppose a *vertex* presentation at the inferior strait, with the occiput under the pubis. (Plate XVII., Fig. 96, and Plate XVIII., Fig. 100.)

The instrument being applied according to the rules given, the practitioner should embrace the handles with his right hand, generally with the knuckles presenting forward; a little pressure, approximating the handles, compresses slightly the head, fixing the blades firmly. Then, during the existence of a pain, the practitioner may make a traction effort in the direction of the occipito-mental diameter of the head, which now corresponds to the axis of the inferior strait. This traction effort, if the resistance be slight, may often be sufficient. If this, however, be not the case, a slow

motion of the hand may carry the blades toward the left thigh of the mother, to the distance, it may be, of some two inches, and then, the traction effort being steadily kept up, the handles may be slowly carried toward the opposite thigh, to the same extent; and, if the pains still continue, this pendulum motion may be repeated. As soon as the bearing-down effort ceases, the practitioner should intermit the action of the instrument, allowing the head to recede, and thus remove the compression from the blades of the forceps on the head. On the recurrence of a pain, the same compression, traction, and lever-like motion should again be instituted and persevered in until the pain has subsided, when they should be again intermitted. Also, in those cases where the patient makes no effort for self-delivery, it is well not to act constantly with the forceps, but at intervals, so that the head may not be exposed to constant pressure, and the tissues of the mother may not be too rapidly distended. As the head advances, of course the direction of the occipito-mental diameter alters, and the direction of the handles of the forceps should be allowed a corresponding alteration. No force should be applied for this purpose, but the handles be permitted to ascend toward the pubis, in proportion as the head extends and advances through the vagina; and it will be found, therefore, when the head is passing perpendicularly through the orifice of the vagina, the handles may be in front and parallel to the pubis, or, even if the perineum be rigid, will be turned somewhat over the abdomen. (Plate XVII., Fig. 97.)

During the progress of the head through the vagina, the greatest care should be taken to prevent rupture of its tissues and those of the perineum. We do not think, if the forceps be properly constructed, with fenestræ sufficiently large to admit the parietal protuberances, that the presence of the blades increases the liability to rupture the perineum. Perhaps, indeed, it may be contended that such liability is diminished by the forceps, as they themselves occupy no space as regards the lateral diameter of the head, and, at the same time, this diameter may be regarded as slightly diminished by the pressure of the forceps.

Whatever may be the truth of this remark, there can be no doubt that the injudicious use of the forceps may be followed by injury of the perineum. Hence, as the head advances, the perineum must be very carefully supported by an assistant, or, what is better, by the fingers of the left hand of the practitioner, in the manner formerly directed; paying great attention especially to the posterior commissure of the vulva, and at the same time giving a proper direction to the handles of the instrument, so that the blades shall not press, by their

edges, against the orifice of the vagina. It is also of great importance that the practitioner should not be "in haste to deliver;" the chief mechanical difficulty usually exists at the bony strait; this being overcome, the resistance from the soft parts seldom demands that much force should be exerted by means of the forceps. Hence, such force should be partially or totally intermitted after the bones have been passed, and time be allowed for gradual distension of the canal and orifice of the vagina; especially is this caution necessary as the parietal protuberances pass the orifice of the vagina. Care should be taken that, as the perineum glides over the face and chin of the child, it should not be injured by the edges and point of the forceps, which may occasionally project somewhat beyond the face of the child.

To avoid these dangers, it has been strongly recommended by Velpeau, after the parietal protuberances have passed the rami of the ischia and pubis, if the bearing-down efforts continue, to remove the forceps from the head, while it is still in the vagina. This process of removal may be effected by loosening the screw of the pivot, and then by the right hand gradually draw the female or right branch in a direction the reverse of that in which it was introduced; that is, gradually elevating the handle obliquely over the left thigh and groin of the mother, and at the same time making a traction effort carefully, that, as the blade recedes from the vulva, its concavity may be kept in close contact with the convexity of the head; then the male or left branch can be removed in the same careful manner, by carrying the handle over the right thigh and groin of the mother. It is possible that such a movement may be occasionally necessary, but certainly this practice can seldom be proper: for, as already observed, the liability to injury of the perineum is not enhanced by the presence of the blades; their removal also deprives the practitioner of power to render any further assistance, and may sometimes even necessitate a re-application; and, moreover, this removal, under the circumstances of a rigid perineum, is not a safe operation for the tissues of the child, for it should be remembered that under the degree of pressure, to which the head is necessarily subjected by the forceps, the skin of the scalp and face of the child project into the fenestræ, almost like a button. Hence, even if great care be employed and a slight rotatory motion be given, there must be danger of inflicting injury on these tissues while removing the blade. The best rule, therefore, is, that when the forceps are applied, to allow it to remain until the head be fairly delivered, when its removal, of course, is easily effected.

If the head be *in the cavity of the pelvis*, (Plate

Fig 105

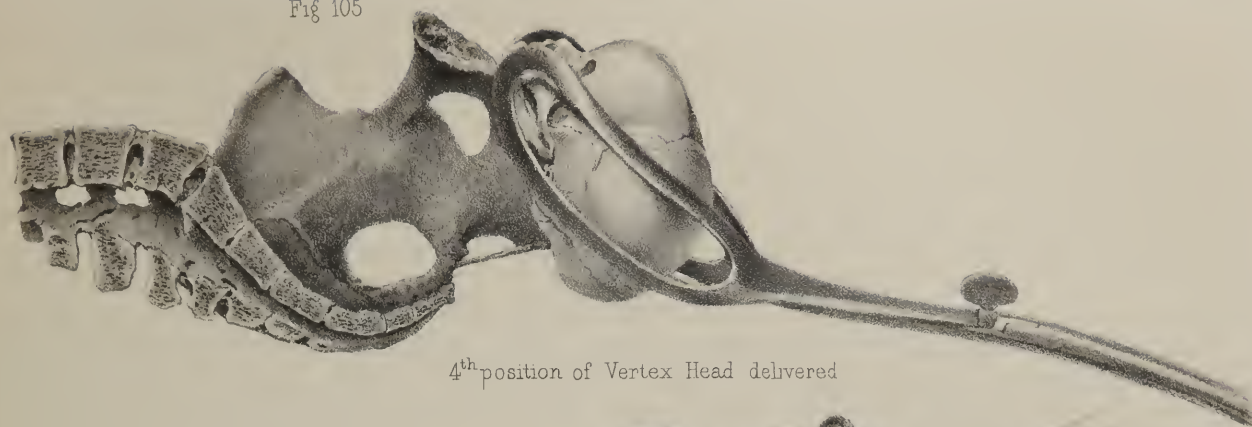


Fig. 106.



Fig 107

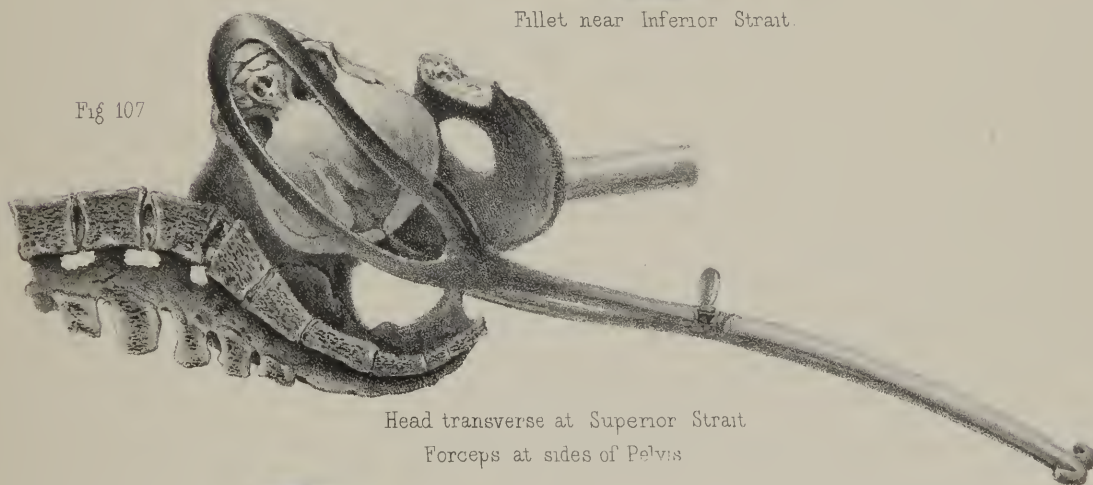
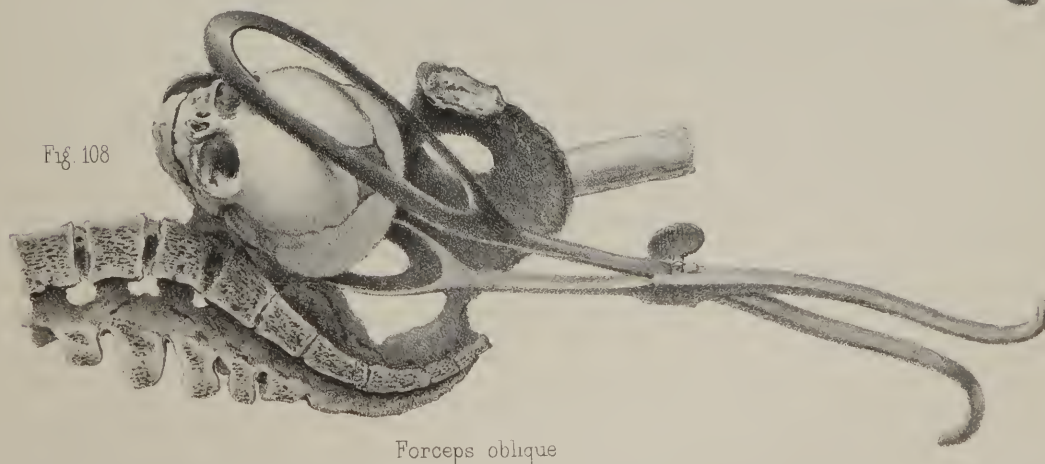


Fig 108



XVII., Fig. 98,) and the occiput opposed to the left anterior inclined plane, and the forceps be properly applied, so that the handles are oblique toward the left thigh, the same general rules for the use of this instrument are applicable. A slight compression, therefore, is to be made, and traction effort should be directed downward, and somewhat to the left in the direction of the handles, while the leverage of the forceps should be exercised by directing the handles obliquely from the left thigh of the mother toward the right groin; that is, from one handle toward the other, taking care that the extent of the motion be even more limited than when at the inferior strait. As the head descends, the practitioner should bear in mind the necessity of *rotation*; at the same time he should not force it, by twisting the forceps, as recommended by Velpeau, Chailly, Cazeaux, and most of the French authorities, also by Ramsbotham, and Miller, (of Kentucky,) but allow it to occur naturally, from the influence of the lateral inclined plane as continued by the side of the vagina. In this advice we are supported by the high authority of Dr. Dewees, and it is in perfect accordance with the natural mode of delivery. Hence, it will be found that, as the head descends and rotates, that the forceps, if not restrained by the practitioner, will gradually lose their oblique position, the handles passing from the left thigh toward the axis of the inferior strait, and the pivot, instead of pointing obliquely toward the left groin of the mother, will point upward parallel to the pubis; then, of course, delivery will be effected as when the forceps were originally applied, at the inferior strait.

The above rule of *allowing* rotation to occur, and not to force it, is, we conceive, of great importance; for it is very difficult for any practitioner to determine the precise moment at which such change should take place, and to use force, therefore, might be inopportune and dangerous to the tissues of the mother and the child, and certainly it is unnecessary, as such rotation will inevitably ensue, as the head descends upon the anterior inclined plane of the pelvis and vagina.

When the head is *at the superior strait* in the first position of the vertex, (Plate XVIII., Fig. 99,) the use of the instrument must be conducted in the same manner as in the cavity of the pelvis; the lever-like motion is given obliquely from one handle of the instrument to the other, and it must be done slowly, and to a very moderate extent, for fear of injuring the edges of the os uteri, and other important tissues at the superior strait. Traction effort also should be carefully made with the handles of the forceps, carried back close to the perineum, and be continued in the same direction

until the head has descended into the cavity of the pelvis. (Plate XVII., Fig. 98.) After rotation has occurred, and extension commenced, the direction of the handles will be more and more anterior as the head advances. (Plate XVII., Fig. 96.)

During the descent of the head into the cavity of the pelvis, it may often be advantageous, while the practitioner is using the forceps, as tractors and levers, to place the fingers of the left hand in front on the shanks or joint of the forceps, so as to make a direct pressure downward, and thus determine the blades more directly in the axis of the pelvis. By this manœuvre the head will be directed firmly against the coccyx and perineum, and not be drawn against the pubis.

The author feels justified, from his own experience, in making the above declarations of the use of the forceps at the superior strait of the pelvis. The operation, under these circumstances, is, moreover, becoming more frequent, as the correct knowledge of the mechanism of labor is better understood. In this country, as well as on the continent of Europe, it is often resorted to. The distinguished Velpeau is a strong advocate for the forceps at the superior strait. He expresses his astonishment that it should be opposed by so many practitioners, and thinks there should be no dispute upon the subject. This opinion is not in unison, as we have already mentioned, with that of the great mass of British practitioners. Even on the continent of Europe, although frequently executed, it is, nevertheless, considered as very serious to mother and child. The difficulties, says Cazeaux, multiply as the head is higher in the pelvis, and the operation is sometimes impracticable. Chailly would prefer version, in all cases, at the superior strait, except where there is a disproportion between the head and the pelvis.

Such testimony should render every practitioner cautious; he should very carefully investigate the peculiar characteristics of the case, and the dangers to the child and mother. If the os uteri be fully dilated, and there be at least three inches in the antero-posterior diameter of the superior strait, the head of the ordinary size, and it be evident that the mother cannot deliver herself, then, in our judgment—instead of resorting to the more dangerous operation of podalic version, or the necessarily fatal operation of craniotomy—the forceps should be carefully applied, and slowly and cautiously used so as to facilitate the adaptation of the head to the contracted passages of the pelvis, and its more rapid descent, under the hope that the child's life may be preserved.

As to the application of the forceps, when the head is "*movable above the superior strait*," although recommended by the French authorities, we can hardly con-

ceive that it will be ever justifiable; inasmuch as by the time the os uteri is dilated, the membranes ruptured, and the waters evacuated—all of which should occur before the forceps ought to be applied—the head will be so fixed by the bearing-down efforts of the mother, in any case where there are three inches in the antero-posterior diameter of the superior strait, that it should no longer be considered as “movable.” To speak with scientific accuracy, the head may be regarded as *above* the superior strait, when the parietal protuberances have not descended as low as the linea ilio-pectinea; and, in such cases, the forceps may be requisite; but the *fixation* of the head, and its partial projection through the superior strait, seems to us essential prerequisites for the operation of the forceps. This is the opinion, also, of Madame Lachapelle, who considers the use of the forceps as difficult and dangerous; difficult, as an accurate diagnosis cannot always be made, and dangerous, because the head will be imperfectly embraced by the forceps, and the blades cannot be applied to the sides of the head—they may slip, and thus injure the tissues of the child and mother. Hence, Madame Lachapelle, Simpson, and Cazeaux prefer version by the feet where the head is movable. Cazeaux, however, states that version by the feet is sometimes impracticable in these cases, and, therefore, recommends, when the head is *fixed*, the application of the forceps, carrying the blades, not exactly to the sides of the pelvis, but rather obliquely toward the sacro-iliac symphysis and acetabulum; when it will be found that they usually embrace the head, not over the occiput and os frontis, but obliquely over the coronal boss of the os frontis and the side of the os occipitis. (Plate XX., Fig. 108.)

In the *second position* of the *vertex*, whether the head be at the inferior strait, in the cavity, or at the superior strait of the pelvis, (Plate XVIII., Fig. 101,) and the forceps be applied, as already directed, the practitioner must act precisely as in the first position, with the exception, that as the handles are now toward the right thigh of the mother, when the head is oblique, the lever-like motion of the handles will be oblique from the right thigh of the mother toward the left groin, and, of course, the handles will gradually be brought, as the head rotates, from the right toward the left, and not from the left toward the right, as in the former instance.

In the *third position* of the *vertex*, (Plate XIX., Fig. 102,) the application of the forceps being made, the blades at each period of descent are toward the sides of the pelvis, and hence the lever-like motion of the handles is always directed from one side to the other; and, of course, traction effort being in the direction of the obstetric axis, must vary in the different periods

of descent, being at first directed far back toward the perineum, and gradually advancing as the head extends.

In the *fourth position* of the *vertex*, when the head has descended to the inferior outlet, (Plate XIX., Fig. 104,) much care is requisite to prevent the blades of the forceps, after their application, from moving upon the head. This is to be accomplished by grasping the head somewhat firmly, but chiefly by making the traction effort nearly in the axis of the superior strait, and continuing the effort in this direction until the occiput spontaneously advances along the posterior wall of the vagina to the vulva. This is in opposition to the advice of very high authority, but is supported by the known fact, that as the occiput descends along the face of the sacrum and perineum, flexion will necessarily occur. Hence, the only business of the practitioner is to cause the occiput to descend, by means of the forceps; the flexion will be spontaneous. It is obvious, also, that if a forcible attempt be made with the forceps, there is great danger, if the head does not yield readily, that the blades will move on the sides of the head of the child, seriously endangering its tissues.

As soon as the occipital protuberance has passed the posterior commissure of the vulva, the handles must be carried backward, (Plate XX., Fig. 105,) as the forehead and face pass from under the arch of the pubis.

As, during the period of the descent of the occiput over the posterior part of the vagina, there is great danger of rupture of the perineum, this portion of the delivery should be accomplished very slowly, the fingers of the practitioner being so directed to the distended perineum as to afford it the greatest possible support.

In this fourth position, when the head is *oblique* in the pelvis, delivery by the forceps is to be effected by drawing down the head, and giving a restricted oblique motion to the handles of the instrument from the left tuber ischii toward the right groin; and as the head descends, rotation must be directed posteriorly, so as to accommodate the pelvic curve of the forceps to the curve of the pelvis. If rotation should occur anteriorly, then the convex edge of the forceps would approximate the pubis, and the points would be directed toward the rectum and sacrum, with manifestly great danger to the tissues of the parent.

Although the above mode of delivering the head in the oblique occipito-posterior positions has received the universal sanction of the profession, we cannot believe that it is correct, and, for ourselves, have never adopted it. Even long before we were acquainted with the demonstrations of Professor Nægèlè, showing that in a very large proportion of occipito-posterior positions,

the occiput would naturally rotate forward, we acted upon the principle that such rotation was, in every respect, desirable, and ought, therefore, to be facilitated. The facts brought forward by Nægelè, and fully confirmed by our personal experience, have corroborated the idea that this natural tendency should always be assisted, and be made to occur, even in those cases where the occiput, striking upon the posterior inclined plane of the pelvis, would naturally rotate to the sacrum.

The plan, therefore, we adopted very early in our obstetric career, was to effect rotation anteriorly by the finger, if possible, or by means of the vectis or lever.

In the manual operation in this fourth position—where the anterior fontanel is opposite the left acetabulum—the practitioner should direct the index finger along the side of the child's head, between the occipital protuberance and the base of the cranium, stretching the point of the finger, as far as practicable, toward the temple. By pressing firmly, during the existence of a pain, upon the side of the head, anterior rotation of the occiput may be effected; the finger really exerts great power, using the head very much as a lever of the "first kind," the fulcrum being at the junction of the cervical vertebræ with the occiput. The practitioner must not, however, expect to accomplish this rotation immediately, but by renewed attempts at every successive bearing-down effort of the mother. Thus, there should be no sudden twisting of the neck, and no improper force exerted, but a gradual rotation be accomplished, precisely in accordance with the natural mechanism of labor. Indeed, as soon as the occipital protuberance strikes upon the spinous process of the ischium, there will be a natural tendency for the occiput to turn anteriorly, and thus the practitioner will find himself co-operating with the natural efforts. This operation with the finger may be commenced even when the head is high up, as soon, at least, as the os uteri is dilated, for then the head is more movable, and, of course, rotation is effected more readily. Dr. Clarke, in 1800, published a paper, in which he recommends producing rotation by means of the finger. Baudelocque, Burns, Dewees, and others confirm the correctness of this practice. It can be easily executed, even without the consciousness of the mother, and without the least danger to the child. It is altogether unnecessary, and would be painful, to introduce the hand, as recommended by Dr. Bedford.

We cannot subscribe to the advice given by Nægelè and his admirers, to leave such changes entirely to nature; and this for two reasons which we deem satisfactory:—The first is, That it is impossible to predict

à priori whether the occiput would not, if left to itself, rotate posteriorly, rather than anteriorly; therefore, it is the duty of the accoucheur to secure the anterior rotation; and, if the experience of the author be received, such rotation can always be accomplished. The second reason for assisting even those cases where it is manifest that the occiput will advance anteriorly is, that this process, although it can often be accomplished without great delay or suffering, is a cause of tedious and painful labor. This must be the case, inasmuch as the occiput has to rotate in these fourth positions to the extent of one-third of a circle—from near the spinous process of the ischium to the orifice of the vagina; while in the anterior positions of the vertex, the rotation is usually but about one-eighth of a circle. Let it be remarked also that this rotation—when the occiput is far back—is accomplished at first very slowly and with considerable difficulty.

These observations are fully borne out by statistics, and indeed by the experience of almost every accoucheur who has been obliged, in many cases, to resort to artificial delivery, especially by the forceps, and, in some instances, even by embryotomy. We consider it, therefore, to be the duty of the accoucheur to *facilitate rotation anteriorly*, in all cases where he has carefully made his diagnosis; inasmuch as it is always incumbent upon him to diminish the sufferings and anxieties of his interesting patient, and to lessen the dangers which may exist either to mother or child, even from delay. In giving this advice, we doubtless will fall under the censure of those who pour their anathemas upon what they call "*meddlesome midwifery*," which expression, although it may serve as a caveat to the ignorant and rash, the author has always regarded as an evidence that those who employ it are themselves ignorant alike of the extent of the resources of nature and those also of science; and, hence, "*trusting to nature*," until the dangers to the child and parent are so cumulative that artificial assistance tardily rendered is not only unavailing, but often accessory to a fatal termination. He who understands accurately the natural modes of delivery, and the resources of his science, may enjoy the unspeakable pleasure of diminishing corporeal and mental suffering in a very large number of these cases, which might possibly, after much delay, have terminated without assistance, and very often of preserving lives which would otherwise have been sacrificed.

If rotation cannot be accomplished by the fingers in the manner specified, it can perhaps universally be produced by instruments. This process of causing rotation in the occipito-posterior portions toward the anterior part of the pelvis, the author has effected by

means of the vectis. For this purpose, in the fourth position, (Plate XIX., Fig. 103,) after the head has passed the os uteri, the cephalic curve of the lever should be directed over the top of the head toward and in front of the right sacro-sciatic ligaments; then, by depressing the handle, the blade will pass over the right or sacral side of the occipital bone, the shank of the instrument being oblique in the vagina. Traction may now be made, during a pain, using the instrument gently, with the usual precautions, as a lever. By operating slowly at each return of pain the occiput will be found slowly gliding along the anterior plane of the pelvis as formed by the bones and the levator ani muscle, toward the pubis, and the fourth will thus be converted into a second position. The use of the lever may, if necessary, be continued until rotation is perfected, or this instrument may be removed, and, if circumstances require it, the forceps applied as in an original right occipito-anterior position of the vertex.

In all cases, therefore, whether, owing to a deficiency of the expulsive powers, to the size of the child's head, to any deformity of the pelvis, or, indeed, to any cause, if anterior rotation does not readily occur, and manual assistance is inefficient, the lever should be resorted to. It is safe to mother and child, is very effective, and acts in perfect accordance with the natural modes of delivery. In the author's hands, the lever has always been successful, and he considers it far preferable to the forceps in the posterior positions of the vertex; inasmuch as when the curved forceps are employed in such cases, the occiput must rotate posteriorly, and the child and parent be exposed to the dangers incident to the delivery of the head over the posterior perineum. Those who are acquainted with the history and operations of the forceps are aware of the mischiefs which have resulted under these circumstances; and the difficulties are always so great that the prudent practitioner declines their use as far as possible; and even the experienced members of the profession have sometimes found it impossible either to apply them or to use them after their application.

Dr. Meigs states there is much difficulty of applying the forceps in these instances so as to bring the blades parallel to the oblique diameter; but they will usually be parallel to the vertical diameter. Hence, there would be danger of contusion, laceration, and cutting the scalp.

Cazeaux also mentions a case in which the long French forceps were applied in the fourth position of the vertex, and even after rotation had occurred to the sacrum, delivery was impracticable. Knowing that the child must soon perish, he determined to make rotation,

by means of the forceps, of the occiput toward the anterior part of the pelvis. This he accomplished to the extent of getting the occiput toward the obturator foramen, when he very prudently removed the forceps, and re-applied the blades to opposite sides of the head, so that the concave edge of their pelvic curve should correspond to the pubis. Strange to relate, although so much force had been applied by the forceps ineffectually to cause delivery of the head with the occiput posterior, and although the head was made to revolve to the extent of a semicircle, at the risk of injuring the spinal marrow, the child was nevertheless born alive.

Professor Simpson, with his usual acumen, has devoted attention to these occipito-posterior positions, and wisely concludes that the tendency to forward rotation ought to be encouraged by the practitioner. For this purpose he follows the example of Smellie, who, in 1745, by means of the straight forceps, rotated the occiput from the posterior to the anterior part of the pelvis. Dr. Simpson would therefore greatly prefer the straight forceps, which doubtless will prove very efficient. We think, however, that there are two serious objections to their use in these cases. In the first place, the blades would be applied to the head in the direction of the trachelo-bregmatic diameter of the head. Hence, the points of the instrument would project beyond the base of the cranium, and might impinge against the shoulders or neck of the child, especially when a twisting motion is imparted to the instrument and head. In some cases another danger attends the application of forceps whenever the blades correspond to the perpendicular diameter of the head, viz., the wounding of the umbilical cord, should it happen to be entwined around the neck of the child, endangering, of course, its life from hemorrhage.

The second objection to the forceps, is the danger of injuring the scalp of the child by the irregular pressure of the edges of the forceps in attempting to produce rotation.

For these reasons, in addition to those already advanced, we greatly prefer the lever to convert the fourth into the second position, or the fifth into the first. Let it be added, also, that the application of the lever, in such cases, is far easier than that of the forceps, and, as just mentioned, far more favorable to the child and its parent. Professor Simpson suggests that in such cases the lever might be useful, but acknowledges he had not attempted its employment. Dr. Ramsbotham, who employs the straight forceps, says that in these oblique occipito-posterior positions, rotation of the head may be effected by turning the occiput anteriorly or posteriorly, but prefers posterior rotation, as involving less danger from the twisting of the neck of the child.

When the head in this fourth position is *at the superior strait*, the same general principles should guide us. We should attempt anterior rotation by means of the fingers in the first place; if not successful, then by means of the lever; after which, if necessary, the forceps may be applied as usual in the right occipito-anterior position. If, however, unfortunately from any cause, this anterior rotation cannot be accomplished, then the forceps may be applied *secundum artem*. In operating with them, however, as tractors and levers, the lateral motion from one hand to the other should be very restricted in the direction of the left tuber ischii to the right ramus of the pubis; and if the forceps are continued after the head has descended into the pelvis, rotation should be made of the occiput into the hollow of the sacrum.

In the *fifth position* of the *vertex* the same rules are to guide us, when the head is oblique, as in the fourth position; the first and important indication, is to convert this fifth into a first position, by insuring the gliding of the occiput along the left anterior inclined plane of the pelvis, by means of the fingers, if practicable, or by means of the lever, as already detailed in speaking of the fourth position; bearing in mind, however, that, in this case, rotation occurs in the opposite direction from that in the fourth position. Hence, the fingers should be pressed on the right temple of the child, which is now pubic, or the lever should be applied to the left side of the occiput, which is now sacral, and the occiput thus be determined from the posterior to the anterior part of the pelvis on the left side.

If, however, the forceps, in this oblique fifth position, be demanded, they should be used as in the fourth position; bearing in mind that the handles should now move from the right tuber ischii to the left ramus of the pubis, and, of course, rotation should occur at the occiput, from the left toward the right, posteriorly.

At the superior strait in this fifth position, the principles of treatment are precisely the same as in the fourth.

In the *sixth position* of the *vertex*, the forceps being applied when the head is at the inferior strait, or in the cavity of the pelvis, the blades will correspond to the sides of the pelvis, and the pivot, of course, will be directly forward. Hence, in acting with the instrument, no rotation will occur; but the practitioner, while making traction, will gently and slowly move the handles of the forceps from one side to the other.

At the superior strait, flexion of the head being perfect, the forceps being applied, the handles will be found far back toward the perineum, and the head may usually be delivered without great difficulty. In these

cases, however, owing to an enlargement of the head, rigidity of the tissues, etc., there may be more trouble, as the short diameter of the strait is now involved. It has been advised, therefore, after the forceps have been applied, to grasp the head firmly during the absence of a pain, push it directly upward, and give a sideling motion to the forceps, so as to disengage the head from the bones. This being accomplished, the head should be brought into an oblique position, the occiput toward the right or left sacro-iliac symphysis, and then delivery be effected as in an original fourth or fifth position of the vertex. After such change has been, however, made, it may be advised to allow the occiput to rotate toward the hollow of the sacrum, as it will be dangerous to continue the rotation converting an original sixth position of the vertex into an occipito-pubic position.

The forceps have also been recommended—perhaps by every authority—in the *left or right occipito-iliac positions of the vertex*, (the seventh or eighth of some authors,) when the head is toward the inferior strait, or still in the cavity of the pelvis. To this practice the author is decidedly opposed, as being unnecessary, always dangerous,—at least to the tissues of the mother,—and sometimes impracticable. It is *unnecessary*, because, as we have formerly shown, the mechanism of labor in these cases is precisely as in first or second positions; the occiput will, therefore, always rotate forward, provided there is no unnatural obstacle; and, if there be any unusual difficulty, such rotation can be effected by the fingers, or by the lever, as already directed,—at least, to such a degree as to get the head oblique in the cavity of the pelvis,—when, if requisite, the forceps may be applied. It is *dangerous*, inasmuch as it presupposes the application of the blades of the forceps, one to the pubis and the other to the sacrum; which is always difficult, and cannot be effected without the most imminent danger to the integrity of the urethra, bladder, and, it may be, the rectum: a danger the greater in proportion to the impaction of the head between the pubis and sacrum. *In no case, therefore, in our opinion, should the blades of the forceps be ever applied directly to the pubis and sacrum.*

When the head is “impacted” in its bi-parietal diameter, between the promontory of the sacrum and the pubis at the superior strait, the proper modes of delivery, including the use of the forceps, will be fully discussed under the head of Dystocia from Deformed Pelvis.

These observations will suffice to give a general idea of the structure and nature of the forceps, their application, and of their *modus operandi* in effecting

delivery. Under the head of Dystocia, some allusions will be made to modifications of these rules, arising from peculiarities of presentation and position, and from deformities of the head or pelvis.

DANGERS OF THE FORCEPS.—We are now prepared to estimate, with some degree of precision, the dangers to mother and child which may result from forceps deliveries. The author ventures the declaration, that these dangers have been greatly over-estimated, and that they are comparatively slight, if the instrument be suitably constructed, and in the hands of a well-instructed, prudent, and judicious operator.

The dangers to the child are greater than those to the parent, inasmuch as the instruments, by their pressure, may injure the scalp of the child, its bones, and even, in bad cases, the membranes, and the brain. Nearly all these results may be safely charged to the abuse of the forceps. If the instrument be properly constructed, and judiciously employed, there will be no severe contusion, no laceration of the scalp, bones, etc., even if great pressure be made, and continued for a long time. The compression made upon the head, when the forceps are applied laterally, is so equable that the head may be diminished considerably in its transverse and elongated in its occipito-mental diameter, and there is little comparative danger of inflicting any contusion or wound. In all ordinary cases of forceps delivery, the degree of pressure which ought to be made upon the head is very trifling, and, we have every reason to believe, very innocuous, especially as it is but for a short time, and the child's head is speedily delivered from the prolonged pressure to which it would have been exposed without instrumental assistance. The child's danger, therefore, in all such cases, is diminished, not aggravated by the forceps.

In extraordinary cases, where there is a disproportion between the head and the pelvis, much pressure must, of necessity, be made upon the head, to facilitate its passage; transverse diameters must be diminished by the efforts of nature, or by the instrument of the accoucheur, or by both; for, if nature cannot, in sufficient time, perform her work, or be altogether inefficient, she should be assisted by the scientific operator. That the life of the child, under these unfortunate circumstances, is often compromised, there can be no doubt; but it is a very illegitimate and unwise conclusion to attribute the death of the infant to the operation. This event resulted from the disproportionate size of the head and straits, necessitating a diminution of the size of the head. This is the real difficulty, the actual cause of death; the forceps used in such cases do not aggravate the danger, but diminish it; inasmuch

as by the increased power thus employed, the dangerous compression of the head is made of short duration, and, therefore, far less likely to be fatal. The experience of instructed accoucheurs fully confirm this view of the subject; for, perhaps, every one of much experience is fully satisfied that, in numerous cases, labors otherwise impracticable have been completed by the forceps, with perfect safety to the child. We have always thought that it is great injustice to this valuable instrument to parade, in statistical tables, deaths of the child, and deaths of the mother, as arising from the forceps, when such unfortunate terminations were evidently the result of the complications of labor,—the deformities, the rigidities, the convulsions, the hemorrhages, etc.—and not of the forceps, when they occurred in spite of this invaluable instrument, whose whole tendency was to diminish, not to aggravate the danger. We will refer the reader to the use of forceps in deformed pelvis, for further remarks on the dangers arising from pressure on the head of the child during labor, and for the real cause of death in these cases.

A minor trouble is not unfrequently observed when children have survived a severe forceps delivery. It consists in the partial paralysis of the muscles of the cheek, eyelids, etc. Such paralysis is trivial, and generally disappears in the course of a few hours or days, although, sometimes, it has been said to continue two or three weeks after delivery. Landousy, Dubois, Cazeaux, etc., have speculated on the cause of this, which is no doubt attributable to the pressure of the forceps on some of the facial nerves. Cazeaux thinks chiefly on the facial branch of the seventh pair of nerves.

The dangers to the mother, in forceps cases, as already intimated, are less than those to the child.

If the blades be not too wide, they can be introduced, not only without pain, but without the consciousness of the mother being disturbed; and when applied properly, no pressure is made upon her tissues; the pressure is entirely upon the head of the child, and the greater such pressure on the head, the less will be directed against the tissues of the parent. When the forceps are employed, the patient often complains of the increased suffering; but this is to be attributed not directly to the forceps, for the reasons just mentioned, but indirectly, as the uterus is stimulated to greater efforts by the more rapid descent of the head against the coccyx, perineum, etc. So, also, the traction and the leverage powers of the instrument being directed upon the child, and not upon the mother, do not directly increase her sufferings; the only increase of pain arises from the rapidity of the descent and continued pressure of the child against the perineum.

This increase of contractile pain and bearing-down efforts are more than counteracted by the shortness of their duration, for, in a few minutes, a delivery may be effected, which would otherwise require hours of suffering, or even be impracticable. Hence, it is very common for ladies, who once have been delivered by the forceps, to demand their employment in subsequent labors.

This representation, we do not think, to be overdrawn; but it must be acknowledged that, not merely have contusions and lacerations been inflicted upon the parent as well on the child, but that the most serious injuries, even with fatal results, have followed the use of the forceps. In their application, the vulva and vagina have been contused, lacerated, and even perforated; the bladder and rectum have sometimes been opened, and the neck of the uterus has been lacerated, entailing great suffering to the mother, and often destroying life; or, if she survive, she may, for years, suffer from strictures or obliterations of the vagina or cervix uteri, or may be tormented with the disgusting consequences of a vesico- or a recto-vaginal fistula. Such results, even when not severe, are sufficient to excite the prejudices of the ignorant, or the fears of the timid, against the propriety of using the forceps; but, certainly, these mischievous consequences must, very universally, be attributed to one of two causes: the first, the injudicious, untimely, or unscientific use of the instrument; the second, the neglect of the practitioner in not resorting to the forceps, or some other mode of delivery, sufficiently early in labor—but injudiciously waiting for spontaneous delivery, by natural efforts, until the child, it may be, has perished, or such great and continued pressure has been made upon the viscera and other tissues of the pelvis, that inflammation, and even mortification have resulted. And hence, when the forceps have been eventually applied, in such protracted cases, the inflammation, ulcerations, sloughing, and consequent perforations have been attributed, not to the improper delay, which is the true cause, but to the forceps, which were resorted to after the injuries had been inflicted.

Many practitioners, indeed, have been so timid in the use of the forceps, as to restrain their employment to these extreme cases, declaring, for example, as Denman says, "That the head must rest immovable, six hours, upon the perineum, before the forceps be resorted to," or by others, that there should be a cessation of pain, and that the patient should become restless, hot, thirsty, with a rapid pulse, and other indications of actual febrile excitement, before any instrumental assistance be rendered. There can be no doubt that such symptoms of inflammation and fever should be anticipated

by an artificial delivery; and also, that a very large proportion of the vesico-vaginal fistulæ, too frequently to be met with, result, *not from the use, but from the neglect*, of the forceps. They are induced by the continued, unremitting pressure of the child's head against the neck of the bladder and the urethra, interrupting the circulation, and not from any injury inflicted by the instrument. This last observation is confirmed by the fact, that few practitioners ever apply the forceps directly toward the bladder or to the rectum, but somewhere on the sides of the pelvis. The judicious Dr. Burns, of Glasgow, may be cited, as among the few English practitioners who have maintained the innocuous character of the forceps. It is very erroneous, he says, to suppose that they are painful and dangerous, inasmuch as they were, for many years, used clandestinely, without the knowledge of the patient. They can be introduced without pain, and the child be delivered without more suffering than upon ordinary occasions, and without contusion to the tissues of the mother. He also well observes, that it is erroneous to maintain, that because nature may be adequate to the delivery, therefore, no assistance should be rendered; as it is well known that, in many such cases, the child perishes, and, not unfrequently, the mother, both of whom might possibly have been saved by timely assistance. He says, that even in cases of impacted head, it is better to interfere too soon, than to procrastinate, and is supported in this advice by Dr. Hamilton, of Edinburgh, and Oslander, of Göttingen. Cazeaux and others also mention, as dangers arising from the forceps, "the sudden emptying of the uterus," giving rise to inertia and hemorrhage. We cannot perceive any foundation for this opinion, if the operation be performed with the least circumspection; for the presence of the instrument and, also, the subsequent traction, excite increased uterine action, and the uterus cannot be emptied more rapidly than in many ordinary cases of labor, when, by one bearing-down effort, the membranes may be ruptured, the child, and even the placenta, expelled, without any subsequent inertia. If, therefore, inertia and hemorrhage result after the use of the forceps, we should certainly attribute these accidents to other causes than the instrument which would prevent rather than cause them.

Of the general truth of these observations we have no doubt; but, while we thus proclaim our great partiality for this invaluable instrument, when properly constructed and prudently employed, and while we believe that great suffering to the parent may be prevented, and the lives of many children may be preserved with its assistance, we do not recommend

its injudicious or unnecessary employment in almost every case of labor. On the other hand, we must condemn that practice which permits the agonies of labor to be unnecessarily protracted, or the safety of the mother or child to be jeopardized, from the timidity or ignorance of the accoucheur, respecting an agent whose employment necessarily involves no danger.

While thus contending that the forceps can be employed with safety to the tissues of the mother and those of the child, we do not doubt that, where the head is large or the pelvis contracted, or where there has been great rigidity or inflammation, the forceps may possibly contuse or otherwise injure the foetal or maternal tissues; and, moreover, that the additional force, thus exercised, may aggravate, sometimes seriously, inflammatory symptoms. In these delicate cases, much judgment must be exercised to determine whether the forceps or craniotomy be preferable; but certainly, so long as there is any hope of preserving the life of the child, the forceps should be employed, even if they aggravate the inflammation, provided no permanent injury be inflicted on the parent.

The circumstances, therefore, demanding or justifying the resort to the forceps, must vary exceedingly in the various complications of labor. Certain general principles may be stated; but much must be left to the discretion and judgment of the accoucheur; who, being well instructed as to the natural modes of delivery, and familiar with the *modus operandi* of the forceps, can, with considerable accuracy, determine when such assistance may be requisite, and to what extent it may be safely rendered.

As a general rule, the forceps are demanded when there is a disproportion between the resistance to descent and the powers of expulsion. If the resistance be no more than is natural, yet if there be inertia of

the uterus, or if, from any other cause, the bearing-down efforts are, or ought to be, suspended, then the forceps may be used; or, if the resistance be too great, arising from rigidity of the vagina, the muscles, and other tissues of the perineum, or if there be mechanical obstruction from strictures of the vagina, from tumors or deformities of the pelvis or of the head of the child, and if all medical measures are evidently unavailing, and the presentation of the child is suitable, then the forceps may be resorted to—always, however, upon the supposition that the obstruction or resistance is not so great, but that a reasonable hope may be entertained for the safety of the infant. If, therefore, the infant be dead, or even when alive, if there be no prospect of its safe deliverance, it would be wrong to endanger the mother's tissues, by attempting to draw the child through contracted passages, or to excite undue hopes in the minds of the patient or her friends.

When treating of dystocia, under its various divisions, suggestions will be made as to the propriety of using the forceps in special cases; it will be sufficient, at present, to say, that their use is to be restricted to the second stage of labor. The os uteri should be fully dilated, or, at least, very easily dilatable, before the instruments are applied; then, if circumstances demand, they can be used at the first, second, third, and even at the fourth period of descent when the head rests simply on the perineum. The forceps should always be applied to the sides of the head, with, perhaps, one exception, hereafter to be noticed.

It may, also, be remarked, that they are not unfrequently necessary from certain pathological states of the mother, although the phenomena of labor are perfectly natural, and the expulsive power adequate for delivery. These will be detailed under the fourth division of complicated labors.

CHAPTER XIV.

OBSTETRIC OPERATIONS.—INSTRUMENTAL MEASURES.—EMBRYOTOMY.

THE *second division of Instrumental Delivery* includes all those operations upon the head or body of the fœtus, with the intent of diminishing its size so that delivery may be accomplished in cases of otherwise impracticable labor. These operations are included under the head of Embryotomy, or Embryulcia, or more frequently, as the head is usually operated upon, of Craniotomy or Cephalotomy. It is an operation exclusively for the mother; her life is to be secured, if possible, even by the sacrifice of her infant.

Embryotomy includes the idea not simply of cutting the fœtus and diminishing its magnitude, but also very generally of its artificial extraction; hence, as formerly, sharp hooks or crotchets were usually employed to bring away the mutilated infant, it has been commonly known as "delivery by the crotchet."

Embryotomy is probably the most ancient of obstetric operations—that of the fillet, perhaps, being excepted. Certainly no idea would more readily present itself, in cases of perfect arrest of the child, than to divide its tissues, diminish its bulk, and then drag it out by the fingers, or hooks of various sizes and forms; hence, this was the almost universal resort of surgeons, until Chamberlen, Smellie, and Levret introduced delivery by the forceps, which has so often proved a substitute for the perforator and crotchet, even preserving infantile life in many instances when it would otherwise have been sacrificed.

CRANIOTOMY OR CEPHALOTOMY.

Without noticing the innumerable modifications of this operation, we shall give a succinct account of the best mode of performing it, and of the principles which should regulate delivery in these unfortunate cases.

Delivery by this operation implies perforation of the head, diminution of its size, and then its deliverance.

PERFORATORS.—*Perforation of the head* is a simple operation, but nevertheless demands skill and much care, so that the tissues of the mother may not be injured. For in many cases the passages are very con-

tracted; the vulva, vagina, and os uteri are swollen or inflamed, and not unfrequently the vagina is thrown into prominent irregular folds, or the bladder even may interfere with the operator.

Various perforators have been proposed, but few are superior to the simple triangular or lancet-shaped

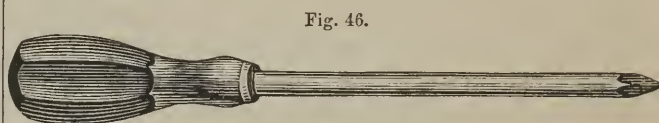


Fig. 46.

Trocar.

trocar, which may be used with or without the ordinary canula. When the head is very high up, and the passages contracted, the inexperienced practitioner may find the canula very advantageous for protecting the soft parts of the mother during the introduction of the trocar. Occasionally, when the head is high up, and especially when the base of the cranium is to be perforated, the trocar may be slightly bent toward its extremity with advantage.

Perhaps no instrument for perforating the head in presentations of its base is superior to the short curved perforator portrayed in Johnson's Midwifery,

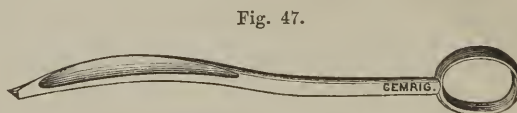


Fig. 47.

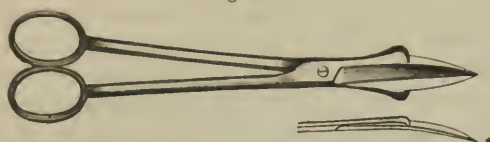
Johnson's Perforator.

with a small triangular point projecting at an angle with the shaft.

The perforator, however, most generally employed in England, France, and America, is Smellie's Scissors. These scissors, as originally constructed, presented a spear-shaped point, when the handles were in contact. Half of this extremity belonged to one blade and half to the other; hence, the cutting edges were to the sides and exterior, while by closing the blades, two flat surfaces usually roughened were

brought into contact. This spear-shaped extremity was about an inch in length and three-quarters wide

Fig. 48.



Smellie's Scissors.

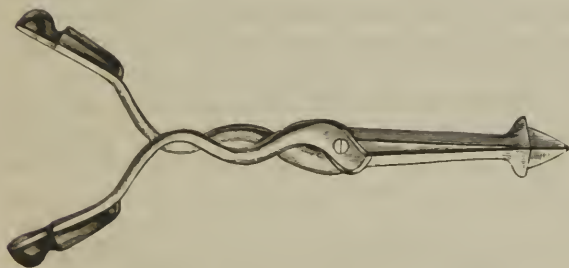
at its base, where there were two projecting flat surfaces or shoulders, which acted as guards to arrest the process of perforation. A slight curve is given to the pointed extremity, so that it is slightly convex on the one side and concave on the other.

The instrument has been somewhat modified of late, in having each blade surrounded by a triangular spear-pointed extremity, sharp on either side. Hence, when the handles are closed, the inner edges overlap each other and operate as common scissors; while the exterior edges cut when the handles are opened.

This instrument must be used with great care, as its sharp cutting edges may very readily come into contact with the mother's tissues when these are much swollen or contracted.

A very excellent improvement of Smellie's scissors, has been made by Mr. Holmes, who caused the long

Fig. 49.



Holmes' Perforator.

handles to be bent so as to cross each other. The advantage of this modification is, that the practitioner can, by one hand, open the blades so as to incise the cranium without the aid of an assistant.

Another more important modification is made by M. Blot, of Paris, which is thus described by Cazeaux:

This craniotome is composed of two blades, which cover each other so that when the instrument is closed the blunt edge of one extends slightly beyond the cutting edge of the other, and reciprocally.

Each free surface bears at its extremity a projection which gives to the point of the instrument a quadran-

gular form; a screw fixed on the internal surface of the movable branch enters a notch in the opposite

Fig. 50.



Blot's Cephalotome.

branch, and limits the motion in one direction, while a spring limits it in the opposite direction. The two branches are articulated, (*à tenon*), which admits of their being readily dismounted.

The advantages of this modification are,

First. They can be used simply as a trocar for perforation.

Second. The cutting edges being concealed, they may be readily introduced without danger to the tissues of the mother.

Third. By acting with one hand upon the handles, the instrument can be used as scissors; and,

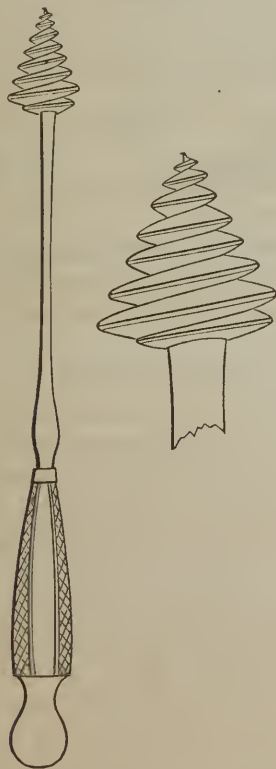
Fourth. As soon as the pressure upon the handles is removed, the spring closes the scissors, so that they can be taken away with safety to the mother. They are thus a decided improvement upon Smellie's scissors.

The German and Belgian practitioners have employed a trephine to perforate the cranium. The trephine (Plate XVI., Fig. 95) is concealed in a bent cylinder, and connected with a handle by means of a chain. The cylinder being passed up to the cranium, the trephine is projected by means of the handle or

crank, and by its rotation a circular portion of the bone may be removed. A specimen of this instrument has been in the author's possession some twenty-five years, but it seems to possess no peculiar advantages over the ordinary perforators.

The author would suggest a more simple form of craniotomy scissors, (Plate XVI., Figs. 87 and 88,) which may be very easily used as a perforator, and also as scissors, without endangering the tissues of the mother during its introduction or removal. They resemble a pair of common scissors, the handles of which are long, the joint broad and strong, and the blades (which are slightly curved laterally so as to be convex on one side and concave on the other) are short and of unequal length; the longer blade measures an inch and a quarter, and the shorter an inch, the cutting edges are inward, and overlap as in common scissors, while the extremity of the long blade is surmounted by a triangular, sharp point, like a trocar, to be used as a perforator, when the handles are closed. After the perforation, by moving the handles, the instrument can be used very safely as scissors. These craniotomy scissors may be also constructed with a blunt point at the extremity of the long blade, and can then be more safely employed for dividing the cranium after perforation has been made by a tractor or other instrument.

Fig. 51.



Harlow's (Cranio-) Diaclast. (Natural size of the Screw is shown.)

Another perforator has been suggested by Dr. Harlow, of this city, a description of which he has published in the *American Journal of Medical Sciences*, January, 1862. It consists of a conical-shaped screw, about one inch and a quarter in length and about one inch at the base, attached to a handle. Dr. Harlow recommends its use chiefly in presentations of the base of the cranium, believing that the dense, firm portions of the sphenoid, temporal and occipital bones can by this screw be broken up.

Although the above instruments may be found specially advantageous, yet any sharp-pointed or cutting instrument, such as a common knife or scissors, for example, may, with a little prudence, be used as a perforator.

While performing the operation with Smellie's scissors—which demand more attention than any other perforator to prevent mischief—the patient, if upon her back, and the head high up at the superior strait, should have the nates brought closely to the foot of the bed; the scissors should be anointed, and the handles be firmly closed with the fingers of the left hand of the practitioner, while the spear-pointed extremity should be directed parallel to the vulva, with one edge anterior and the other posterior, covered with two or three fingers of the right hand of the practitioner. Thus protected, the point is to be glided in the direction of the axis of the vagina, deep into its cavity; then the handles of the instrument are to be depressed, so that they shall touch the posterior margin of the vulva, and approximate the axis of the superior strait of the pelvis; at the same time give a spiral turn to the instrument, so that its cutting edges shall now present laterally, one handle of the blade being toward the left, and the other toward the right thigh of the mother, care being taken that the convex part of the point be toward the posterior, and the concave toward the anterior part of the pelvis. The point of the instrument should now be guided by the fingers of the practitioner, still protecting its edges, to the head of the child, great caution being taken that the walls of the uterus, or any other tissue of the mother, do not intervene between the point and the scalp.

It is a matter of minor importance what part of the cranium is perforated. It will be generally more convenient to perforate a fontanel or suture; Ramsbotham recommends perforating the bone. If the perforator be directed through the scalp, upon one of the bones of the cranium, it should be pressed firmly against it, in a perpendicular direction, so as to prevent slipping, and then, by a rotatory motion, be driven through the cranium, the whole depth of the spear-shaped extremity, till arrested by its shoulders. While this operation is

performed by the practitioner, the hands of an assistant should be applied firmly over the abdomen and the uterine tumor, so as to fix the head at the superior strait. The instrument being thus introduced, the handles may be separated in a lateral direction, so that the cutting edges will then divide the cranium, and thus enlarge the opening. The practitioner, for this purpose, will generally require the aid of an assistant, to act upon one handle of the instrument, while he acts upon the other—as the fingers of one hand of the operator ought to be within the vagina to secure the proper direction to the edges of the instrument. If the opening be now not sufficiently large, the handles of the scissors may be again approximated, and the instrument be turned obliquely, and another incision be then made, and so on, in different directions, if requisite—care, however, being always taken that the sharp edges may not be directed toward the bladder.

This operation with Smellie's scissors is certainly difficult, from the danger of injuring the mother's tissues. We prefer greatly the craniotomy scissors with the trocar point above described; (Plate XVI., Fig. 87;) there will be no danger from the sharp point, as it will be easily guarded by the finger, while the perforation, being once made, the cranium can be easily and safely divided in any direction by using the instrument as scissors—one blade of which is in the cavity of the cranium, and the other exterior, and may be guarded from the mother's tissues, not only by the finger of the operator, but also by the scalp of the child.

In ordinary practice, however, where the practitioner possesses the craniotomy scissors with the blunt, (Plate XVI., Fig. 88,) instead of the trocar point, an opening in the cranium being made, by any perforator, the craniotomy scissors can be readily introduced, so that one blade enters the cranium, while the other passes between the scalp and the bone, thus he can very easily enlarge the opening in any direction.

Diminishing the size of the cranium, and extraction of the head, are the two next steps of the operation of craniotomy. We shall consider them together, inasmuch as the measures very universally employed to diminish the head are precisely the same as those demanded to accomplish its extraction.

The head being perforated, it has been thought important to pass scissors, such as Smellie's, deep into the cavity of the cranium, not only to break up the cerebral mass, but also to divide, as far as practicable, the processes of the dura mater, under the idea that the head would then diminish readily, from the deficiency of its internal supports. This idea, however, has been very imperfectly sustained by experience, although some advantage may be thus gained, yet the integrity

of the head is much more firmly maintained by the bones, and the ligamentous commissures of the cranium.

If the head be not very large, in proportion to the passages, and the expulsive efforts be strong, delivery may be accomplished without further assistance; the perforation and breaking up of the brain being accomplished. Very generally, however, traction effort is necessary to diminish the size of the head, and to cause its descent.

TRACTORS.—Various tractors have been proposed for this purpose. The most simple, and probably the most ancient, consists of a small piece of wood, some two inches long, and half an inch wide, with a strong cord tied to its centre. This can readily be introduced through the opening of the cranium into its cavity, and by traction upon the cord, its whole length will present transversely to the opening, and thus give a firm support to any traction effort.

The advantages of this simple tractor are considerable; it is always at hand, it acts upon a broad surface of the cranium, and is not liable, therefore, to produce fractures of the bone; it allows the traction to be made in any required direction; it acts on the most dependent part of the child's head, usually toward the vertex, and has thus a tendency to elongate the head, in the direction of the occipito-mental diameter, corresponding to the axis of the pelvis; and it admits a great force being applied, if the wood be sufficiently strong.

Johnson's tractor is precisely similar in its operation.

Fig. 52.



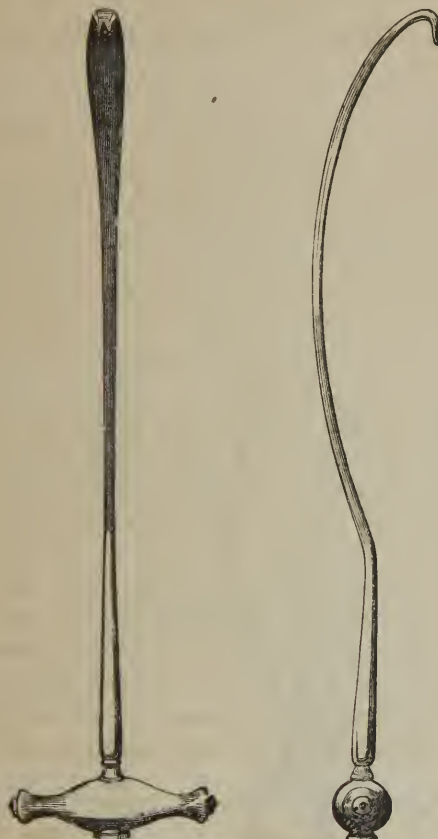
Johnson's Tractor.

but is made of a steel shank or handle, surmounted by a transverse piece of steel, two and a half inches in length, and a quarter of an inch in width. This transverse piece is connected with the shank by a simple joint, so that it can be turned nearly parallel to the shank or handle. This arrangement will admit of its being pushed through the opening of the cranium, and then, when traction effort is made, to assume the transverse position, as in the former instance. Various modifications of this simple extractor, or, as it is termed by the French, "*tirè-tête*," have been proposed. They possess no advantages over those just noticed.

CROTCHETS. (Plate XVI., Figs. 89 and 90.)—The most universal mode, however, of delivery, and certainly one of the most ancient, is by means of hooks, blunt or sharp; hence, the whole operation of craniotomy has been embraced under the expression, "delivery by the crotchet."

Fig. 53.

Fig. 54.



Churchill's Crotchet. (Front and Side Views.)

It is unnecessary to describe this instrument, so familiar to the profession, suffice it to say that the handle is generally of steel, partially covered with wood; it is not perfectly straight, but curved slightly, resembling the convexity of the head. The hook has a short angular turn from the handle, is about three-quarters of an inch long, and triangular.

Perforation of the cranium being made, the crotchet can be easily introduced so as to fix its point upon the interior or exterior of the head. Under the usual presentations, it will be found most convenient to pass it within the head as far as possible, and to turn the point toward the base of the cranium, so as to fix it upon the body or wings of the sphenoid bone, or upon the petrous portion of the temporal bone, or toward the foramen magnum. This, however, is by no means easily accomplished, owing to the posi-

tion of the head, the face being uppermost, so that when traction is made, the hook is very apt to slip from the bone. The practitioner is often obliged, therefore, to fix the hook upon the thin bones of the vault of the cranium, especially at their edges or commisures, while the fingers of the unoccupied hand may be carried exterior to the head, and opposite to the point where the hook is applied. Traction effort may now be made by the handle of the instrument in the proper direction, and considerable force may be exercised.

It is obvious, however, that serious objections must exist to this mode of operating; the traction effort is not as it ought to be in the direction of the axis or longest diameter of the head, but toward the circumference of the cranium, so that on this account some of the force is lost. Rigby appears to confirm this criticism, when he says that traction thus made is apt to displace the proper position of the head. The delicate bones of the cranium, also, are easily fractured by the sharp hook, so that the instrument slips if much force be applied; and it may even be suddenly drawn entirely out of the body, endangering, in the most imminent degree, the integrity of the mother's tissues. This danger, although at all times impending, may be somewhat obviated by the fingers of the practitioner, exterior to the head, acting as a guard; or, as has been suggested, by furnishing another blade of the crotchet, so that the whole instrument resembles a forceps—the second blade opposed to the hook acts as a guard. (Plate XVI., Fig. 90.) The dangers, however, of the slipping of the crotchet are exceedingly aggravated by the fact that the bones of the cranium being fractured, the pieces with sharp saw-like edges are dragged with the crotchet into the vagina, whence their extraction without giving pain to the mother or wounding her tissues will be exceedingly difficult; and moreover, the slipping of the crotchet, and the consequent fracture of the bones, may occur very frequently before the head diminishes materially, and before its descent can be accomplished. There are few accoucheurs who have not experienced great difficulties in the use of this instrument, and who have not witnessed even terrible consequences from its employment.

The crotchet may be also applied to the *exterior* of the cranium, as recommended by Smellie, although not so readily, as it will not always be easy to introduce it between the tissues of the mother and the scalp of the child, and to fix the hook through the scalp on the cranium or face of the child without injuring the parent. If this can be accomplished, however, it is safer than when passed internally; for now the point of the instrument is directed inward toward the cavity of the cranium, and if it slips, therefore, the point is less

apt to do mischief, especially when the opposite side of the head is supported and protected by the fingers of the practitioner, or by using a second blade or guard to the crotchet. The instrument is also less apt to slip on these occasions, as the point is more firmly fixed, acting not merely on the bones, but also on the scalp; nevertheless, if much force be requisite, the scalp, as well as the bones, may be torn away, with the usual dangers above described from fractured bones and the point of the instrument.

Whenever practicable, it would be better to carry the point of the instrument beyond the cranium to the face of the child, where a firm support can be given by the orbits of the eye, bones of the nose, mouth, etc. This, however, can seldom be accomplished.

Should the crotchet be requisite in pelvic deliveries, where the head presents its base, then the crotchet may be more effectually applied to some of the solid portions of the cranium, and there will be less danger of bad consequences. Of course great attention should be paid to give a proper direction to the diameters of the head, when making any traction with the crotchet. So also in face presentations, the crotchet may sometimes be applied advantageously to the anterior fontanel, so that the point can be directed downward to the strong orbital processes of the os frontis; or what is better, the crotchet may be introduced into the mouth and fixed in the posterior nares, when, although the palatine processes will be readily crushed, the superior maxillary bone will afford a very firm support to any traction effort. An advantage also of fixing the crotchet in the posterior nares is that the tractile power will be directed in the long diameter of the head corresponding to the axis of the pelvis. To plant the crotchet upon the lower jaw is not advisable, as the symphysis menti would not bear much traction.

In embryotomy cases, where there is great contraction of the pelvis, crotchets, blunt or sharp, must occasionally be applied to the trunk, as well as to the head. The head, for example, being delivered, blunt hooks may be passed to the axilla of the child to bring down the arms; and it may be occasionally necessary, in such cases, to fix them in portions of the thorax. Crotchets, however, are more necessary in pelvic deliveries, not merely to bring down the limbs of the child, as in breech cases, but occasionally to make traction effort upon the bones of the pelvis. In all these cases, the point of the instrument can generally be so firmly fixed upon the projecting parts of the pelvis, either interiorly or exteriorly, that the danger of injury from slipping is by no means so great as when they are applied to the head.

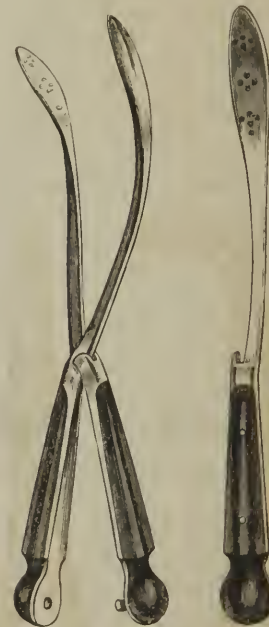
The dangers and difficulties necessarily incident to

the employment of the sharp crotchet, and the *inefficiency*, comparatively, of their tractile power, has induced practitioners to propose substitutes for these terrible instruments.

CRANIOTOMY FORCEPS.—Various kinds of craniotomy forceps, therefore, have been suggested. One has been already alluded to; it is made by giving a second blade to the crotchet, with a lock like the English forceps. (Plate XVI., Fig. 90.) This seems to be an improvement; but in practice the application and employment will be found difficult, and it obviates few, if any, of the dangers of the crotchet.

Dr. Davis, of London, an eminent practitioner at the beginning of the present century, exercised much ingenuity in modifying obstetric instruments; his forceps possess many advantages, and are still extensively em-

Fig. 55.

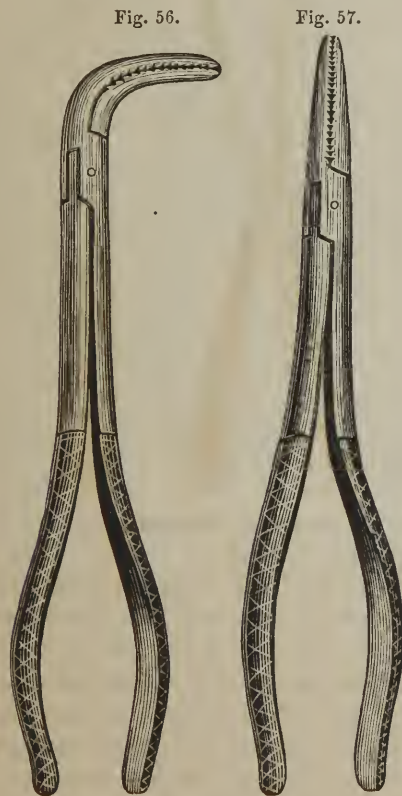


Davis' Craniotomy Forceps.

ployed. His craniotomy forceps, although modified, in various ways, consist essentially of two blades, straight or curved, the shanks of which are some four or five inches long, while the proper blades are about two inches in length, by an inch and a half in breadth, and of a flattened elliptical shape, with the exterior smooth and polished, so that when the handles are closed, they can be very readily and safely introduced into the pelvis; the interior, however, of the blades is armed with sharp teeth on the one blade, usually with corresponding indentations on the interior of the other blade;

although, in some cases, these tooth-like projections are placed in each blade. Hence, when the forceps are introduced, one blade within, and the other exterior to the cavity of the cranium, a comparatively firm hold is taken of the tissues, and thus traction may be made in a proper direction. In practice, however, all the proposed advantages have not been realized. To apply the instruments, whatever variety of curve may be given to them, is by no means easy; the traction is made on the circumference of the head, and not in the direction of its axis, while the instrument may be torn away with portions of the bone or scalp, more readily, perhaps, than those by the crotchet, as the numerous perforations made by the teeth of the forceps through the bone facilitate its fracture.

Dr. Meigs, having experienced great difficulty in a case of labor from deformed pelvis—which occurred to Dr. Fox and Dr. Meigs, many years ago, in this city—in employing all the usual craniotomy instruments, including those of Davis, found that a simple pair of strong pincers, with long handles and short blades, the latter about one inch and a half to two inches long, with transverse indentations on the inner surfaces, could be far more easily and successfully employed.



Meigs' Craniotomy Forceps.

These, in this city, are known by the name of Meigs' Craniotomy Forceps or Pincers. They are certainly far more safe than their predecessors, and may be very advantageously employed as a substitute for the crotchet, etc. They have, however, still the disadvantage of operating too much on the circumference of the head, instead of directly in its axis, and also of readily fracturing the delicate bones of the cranium whenever much force is applied, and thus endangering the tissues of the mother from the sharp edges of the bone, and necessitating their frequent reapplication.

The author has in his possession a pair of Stein's craniotomy forceps, (Plate XVI., Fig. 91,) brought over to this country some forty years ago by a German. They are similar to the curved forceps of Dr. Meigs, with the exception, that the blades are much broader, resembling the shape of the bill of a duck; the inner surfaces are furnished with transverse ridges, and corresponding grooves. Perhaps these have the slight advantage over Dr. Meigs', of embracing a larger portion of the bone, and thus there may be less liability to fracture.

Crotchets and craniotomy forceps have not only been employed as tractors after the head has been perforated, but also in cases of great deformity, to break up and remove the whole or part of the vault of the cranium, so that the head may be diminished to the greatest degree, and present nothing but the bones of the face proper, and the base of the cranium. This difficult and tedious operation has often been accomplished by tearing away one portion of bone after another, but not without the greatest risk to the tissues of the mother. Perhaps no instrument is better suited for this purpose than Meigs' forceps, or the German craniotomy forceps, by which portions of bone being seized can be fractured and twisted off in succession, care being taken not to wound the tissues by the serrated edges of the fragments during their extraction.

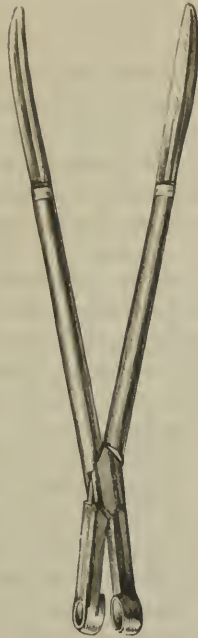
By these measures the whole vault of the cranium may be removed so as to reduce the head to comparatively a very small size, including simply the base of the cranium and the face; the measurements of which would be the bi-temporal diameter, two and a half inches, and the naso-mental diameter, one and a half inches, or, if the lower jaw be broken or removed, this perpendicular diameter of the face will measure but one inch. The head thus reduced could be drawn through comparatively a small opening, especially if the face be made to present; the remains of the occiput would then be applied to the posterior part of the neck.

Other measures have been proposed to diminish the size of the head in these unfortunate cases of extreme

He had two constructed, one straight, and the other with the blades bent at an angle with the handles.

deformity. Dr. Davis, of London, has proposed an *Osteotomist*, or bone-nippers, the short blades being

Fig. 58.



Davis' Osteotomist.

arranged in the form of a "punch," of an elliptical shape. One blade is to be introduced within the cranium, and the other blade exterior, but underneath the scalp. A portion of the bone one inch by half an inch in extent can thus be removed, and so on, in succession, until the head be sufficiently diminished in size. Practitioners, however, do not appear to have sanctioned the osteotomist, as it is now seldom, if ever, employed.

Cranioclast.—Professor Simpson, of Edinburgh, has employed an instrument, somewhat analogous to the

Fig. 59.



Perforator.

osteotomist of Dr. Davis, excepting that the blades are longer, say five inches in length—one being longer than the other, and fenestrated. The shorter has an oblong convexity on its opposing surface, with transverse ridges, which convexity and ridges correspond to grooves in the fenestra of the longer blade. The head being perforated, the short blade is passed internally as far

as possible, toward the base of the cranium, and the long blade externally. These blades being one inch in width, give a strong purchase on the occipital bone,

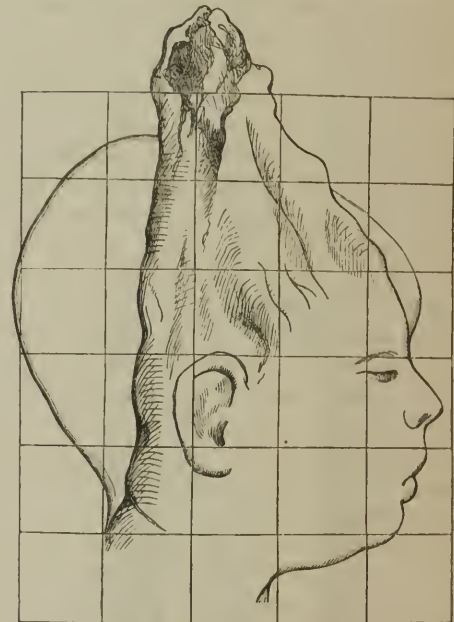
Fig. 60.



Cranioclast.

by which, says Dr. Simpson, it can generally be fractured at the occipital foramen, thus destroying the

Fig. 61.



Head of a Child delivered by Cranioclast. (The outline represents the Size of the Normal Head.)

integrity of the vault of the cranium, and, of course, diminishing the length of the occipito-frontal and occipito-mental diameters. Traction effort may now be made by the cranioclast, and, if the deformity be not great, extraction may be accomplished; the head, it is said, will be thus reduced to half its size, and there is no necessity for extracting the bones of the cranium. In some instances it may be necessary to apply the cranioclast to other portions of the vault of the cranium.

We can perceive no advantage to be gained by the instrument here proposed over the German duck-bill craniotomy forceps or those of Dr. Meigs, and this

whole operation of cranioclasm will be found far more difficult to execute, and far less efficient, we should judge, than the operation of *Compression*, presently to be noticed; especially as its tendency is rather to diminish the longitudinal instead of the transverse diameters of the cranium, which should be the main object of the operator.

Professor Van Huevel, of Brussels, has suggested the idea of dividing the cranium by means of a *chain-saw*, to be introduced into the cavity of the pelvis by means of an ingeniously constructed instrument resembling the forceps. It is not practicable, from the description, to form an adequate idea of the details of its construction or its *modus operandi*, but the Professor states that, by it, the head may be divided into two or more segments, which, after the saw has been removed, can be readily extracted by pincers, in succession, with safety of the patient. He has operated successfully; but Cazeaux informs us, in the few instances in which the operation has been performed by "skilful hands" in France, it has failed.

In minor cases of deformity, we would recommend another mode of diminishing the size of the head. It consists in employing the craniotomy scissors, already described, (Plate XVI., Figs. 87 and 88,) so as to make incisions, as far as practicable, in the length of the head, directing the incision toward and through the parietal protuberances, and also in the direction of the bi-parietal suture. It is evident, that if these incisions be sufficiently long and numerous, the integrity of the vault of the cranium will be destroyed, and of course, under the influence of pressure, the different fragments will fall in toward the centre, greatly diminishing the size of the head.

This slight consideration of the *modus operandi* of crotchets, pincers, craniotomy forceps, and other variety of tractors, demonstrates that they act not directly, but indirectly, in accomplishing the diminution of the head of the child, so that it may pass through the contracted passages. The head is, in reality, lessened,—not by the tractors, but by the bones and soft tissues of the mother; for it is dragged through, for example, the superior strait of the pelvis, and this is the real agent which diminishes the head. The bony strait is covered by delicate and important tissues, such as the edges of the uterus, the vagina, bladder, etc. Hence, such tissues are powerfully compressed between the bones on one side and the head upon the other, greatly endangering their integrity and safety. The greater, therefore, the contraction, the greater will be the risk to the tissues. No wonder, then, that there is danger of contusion, laceration, inflammation, ulceration, and mortification of these tissues in bad craniotomy cases.

Hence, accoucheurs have always dreaded craniotomy operations in confined pelvis, as they have too often proved fatal, not only to the integrity of the bladder, rectum, and other tissues of the pelvis, but also to the life of the mother. Statistical tables of the general results of craniotomy operations, as presented by Churchill, Tyler Smith, Cazeaux, Baudelocque, and others, show a mortality of one in five, or one in five and a half cases.

These dangers are so great, that a limit must be made as to the degree of the deformity of the pelvis in which craniotomy should be employed. The life of the mother will, in some extreme cases, be less jeopardized by the dangerous operation of gastrohysterotomy. It is difficult to fix the above limit; but modern accoucheurs will seldom justify the craniotomy operation, if the opening of the superior strait is not equal to two inches in its short, and at least three inches in its long, diameter.

In the celebrated case of Elizabeth Sherwood, where the patient survived, it was found, as recorded by Dr. Osborne, that the superior strait measured but three-fourths of an inch by two and a half inches. Dr. Davis thinks that the remains of the head could be delivered with the assistance of his osteotomist when there is only one inch in the short diameter of the opening. When, however, we reflect that, if the whole vault of the cranium be removed, the perpendicular diameter of the face, from the root of the nose to the chin, will measure one inch and a half, and the bi-temporal diameter will measure two inches and a half, and, moreover, that, in these confined pelvis, this operation for reduction to this extent is exceedingly difficult and dangerous, and that there must be always some projecting points of bone still remaining, it can hardly be doubted that the risk to the mother will be exceedingly great, and, probably indeed, greater than that of the Cæsarean section, unless there be two inches in the short diameter of the opening. Dr. Dewees is of this opinion, and he seems to be supported by nearly all modern accoucheurs; for, although some excellent and conscientious British authorities restrict the Cæsarean operation to cases where there is less than one inch and three-quarters, or even one inch and a half, yet a large majority of modern accoucheurs will justify the operation of gastrohysterotomy in preference to embryotomy, when the short diameter of the superior strait measures two inches, and even two inches and a quarter—thus sanctioning the idea that great as are the dangers of hysterotomy, they are not greater than those from craniotomy, where the pelvis is greatly deformed. This important principle is not to be invalidated by extraordinary cases in which the life of the mother

has been preserved, when the deformity has exceeded the above mentioned limit. The wonderful escape of Elizabeth Sherwood, the patient of Dr. Osborne, or the still more wonderful fact of a patient of Dr. Simpson delivering herself of a child, *at term*, with impunity, when the opening at the inferior strait, through which it passed, measured only three inches in the antero-posterior direction, and but half an inch in the transverse diameter, are exceptionable cases; they form no rule for practice. In the former case, the bones of the cranium were loosened by putrescency, and the operator was unusually skilful; while, in the case of Dr. Simpson, the child had been dead, probably, for some six or eight weeks, and, therefore, imperfect in its development, and had been macerating in the liquor amnii, so that all the bones of the head, including those of the face and base, were separated and movable, and hence, the head might be considered almost as a soft, compressible bag, filled with loose bones.

The risk of embryotomy in confined pelves will not be much lessened, even if the lower jaw be divided or removed, so as to give but one inch to the perpendicular diameter of the face. If, unfortunately, the practitioner should have to deliver the patient under these circumstances, it should not be forgotten to bring down the face first, as then it will not be complicated with the neck, demanding, in this case, more room for its passage; for, if the face be brought down, nothing but thin portions of the occipital bone will descend with the neck.

After the head is delivered, there may be considerable delay and difficulty in accomplishing the delivery of the body of the child, rendering necessary the reduction of its size, by the craniotomy scissors, or forceps.

COMPRESSORS.—The dangers and difficulties of the operation of craniotomy may, however, be obviated to a very great degree, by introducing a new principle for our guidance.

Many years ago, the author was called in consultation to a case of labor, to which allusion will hereafter be made, when speaking of presentations of the side of the head. A young woman had been in labor for five days. The contractions of the uterus had entirely ceased, and the head was arrested at the superior strait. Forceps were applied by the author, but the head was found immovable, so that craniotomy became necessary. As the forceps were already firmly applied to the head of the child, it was determined not to remove them; but, after perforating the head and breaking up the contents of the cranium, to employ them, first, as compressors, and, then, as tractors. The

handles were, therefore, firmly grasped, and, afterward, pressure was made still more firmly by a strong fillet wound around the handles. The head gradually yielded to this pressure, so that its diameters were sufficiently diminished to allow of its descent into the pelvis, and its subsequent delivery. The patient recovered without any serious symptoms.

In another case where the pelvis was deformed, and which was under the care of Dr. Warrington, it was estimated that the sacro-pubic diameter did not measure more than three inches. Before the author's arrival Dr. W. had made an ineffectual attempt with the forceps. These instruments, however, were re-applied, and again appeared to be insufficient. The author then grasped the instruments firmly, and secured them by a fillet. The death of the child had been previously ascertained. Great pressure and traction effort were made, and in a short time there was a sudden yielding of the head, accompanied with a distinct noise, when delivery was easily accomplished. It was found that the pressure from the forceps had caused the left parietal bone to bend inward, so as to be concave externally and convex internally, greatly reducing therefore the size of the head, and allowing its transit where there were only three inches in the antero-posterior diameter of the superior strait.

The principle developed by these operations is, we deem, of great importance, viz., that the reduction of the child's head, in cases of craniotomy, should be effected, not by the tissues of the parent, as in all the usual operations by the crotchet and craniotomy forceps, but by compressors. For it is evident that just in proportion to the degree of compression made upon the head, is the diminution of pressure against the mother's tissues; the compressors, therefore, do not increase, but diminish the dangers of delivery in a contracted pelvis. Of course, it will be impossible to remove all such pressure, and, therefore, there must be more or less risk to the mother in deformed pelvis; nevertheless, by diminishing the head, chiefly in the direction of its transverse diameter, this risk must be in a great degree lessened, while, at the same time, the facility for subsequent deliverance is proportionally augmented.

There is another very important idea involved in the use of the forceps as compressors, as the more powerful the compression, the more firmly is the head embraced, and the less danger, if the forceps be properly constructed, of any slipping of the instrument. Hence the forceps are the best *tractors* in craniotomy operations. All those inconveniences and dangers, which we have detailed as arising from the use of the crotchet, and the need of all the variety of craniotomy forceps, are almost

entirely obviated, so that delivery, after the compression, may, even in confined pelves, be accomplished with almost the same facility as in ordinary forceps cases.

In the construction, therefore, of the author's forceps, these objects have been borne in mind—the cephalic curve of the blades is so arranged that the head slides more completely into the grasp of the forceps in proportion as the size lessens by the diminution of its transverse diameter. The forceps should be strong and well tempered, so as to admit of much compression being made without any yielding of the blades or shanks; hence, when the handles are brought into contact, we have reason to believe that the head is reduced from three and a half to two and a half inches in its bi-parietal diameter—and then, if the deformity be not great, delivery may be effected.

In order to facilitate this diminution of the size of the head, it will be best previously to perforate the head, break up the dura mater and its attachments, and also by means of the craniotomy scissors to divide portions of the parietal bones, sutures, etc., so as to destroy the integrity of the vault of the cranium.

The importance of the principle now inculcated can hardly be over-estimated. Next to the introduction of the forceps into modern practice, the idea, when the preservation of the child's life is hopeless, of diminishing the size of the head by compressors instead of dragging it through the contracted outlets of the body, by mere force, to the great detriment and often destruction of the mother's tissues, seems one of the most important improvements in scientific obstetrics.

Like other improvements, it has gradually been introduced. Practitioners have often unconsciously used the forceps as compressors without distinctly recognizing the principle itself, and of course the necessity of establishing it as a fundamental rule of practice.

By M. A. Baudelocque, nephew of the distinguished accoucheur, the practical application of the principle was carried out with great boldness, by the introduction, in 1832, and successful employment of powerful compressors which have been termed the "Cephalotribe" or "Brise-tête," and to him, therefore, perhaps the credit of priority is due.

It would appear that in France this instrument is very generally and advantageously employed, to the exclusion almost universally of all hooks, and other extractors, from the practice of the profession.

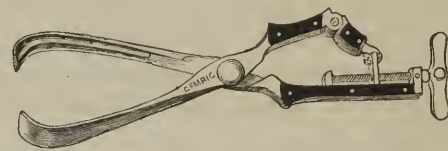
A good idea of the brise-tête of Baudelocque will be obtained from Plate XVI., Fig. 92; it is taken from a specimen received by the author from Paris. The whole instrument is about twenty and a half inches long, and weighs four pounds and twelve ounces. It resembles

in its general conformation the long forceps, excepting that the blades are solid without fenestræ, convex externally, concave internally, and much smaller, although longer; each blade measures in width but one inch and three lines, and in length, from the joint, ten and a half inches. The cephalic curve is slight, so that when the blades are in contact, the greatest transverse diameter from the convexity of one to the convexity of the other measures but one inch and nine lines. The handles measure ten inches in length, and are made to approximate by means of a screw with a mandrel.

The great weight and size of this instrument give it a very formidable aspect, and has doubtless discouraged practitioners in sanctioning its employment. We know not that it has been used in America, and Churchill states that he is not aware of its having been employed in Great Britain.

The practice of cephalotripsy is, however, receiving increased attention on the continent of Europe, and several modifications of the cephalotribe of Baudelocque have been suggested; one of which, by Dr. Braun, we have, through the politeness of Dr. Hall, of this city, been enabled to portray, in Plate XVI., Fig. 94.

Fig. 62.



Braun's Cephalotribe.

Also, in the annexed figure, its peculiarities are exhibited. They consist in having on the concave surface of the blades two longitudinal ridges, and the extremities of the blades turned in like hooks; the screw differs in its arrangement from that of Baudelocque in being placed longitudinally, and closes the blades by means of a joint in one of the handles. As compared with Baudelocque's, this instrument is lighter, but is less powerful. The hook-like extremities of the blades must make its introduction more difficult, and give it more of the character and the faults of the double crotchet.

The theoretical objections to the brise-tête of Baudelocque seem to be very great, *à priori*. First, its weight, amounting, according to the specimen in the author's possession, to nearly five pounds. Second, its unnecessary length. Third, the great power of the screw, and the large size of the handle or crank—all of which circumstances demand great care and attention in its employment, and sometimes may render its use difficult. The main theoretical objection, however, is the effect which such a powerful compression of the

head must have upon its bones, and the dangers which may result to the mother. It might readily be supposed that the bones of the head could be fractured, and their sharp edges be driven through the scalp of the child into the tissues of the mother; all attempts to extract, under such circumstances, would be exceedingly dangerous, if not impracticable.

Experiment and observation have, however, not confirmed these theoretical objections; the author made a number of experiments upon the heads of children that died at term, and found that when the brise-tête was applied upon the sides of the head, the transverse diameter would be readily diminished to two inches, while the occipito-mental diameter and also the cervico-bregmatic were lengthened. The bones were turned inward upon the cavity of the cranium, and although fractured, in no case did they penetrate the scalp, even when no perforation had been previously made. The top of the head projected during the process of compression to a considerable degree beyond the edges of the blades, but this of course would afford no impediment to delivery. Being satisfied of these important points, the author, not willing to employ the heavy instrument of Baudelocque, induced Mr. Rorer, who had assisted him so materially in the construction of his forceps, to make, in 1843, some modifications in the French instrument. These modifications chiefly embrace the size and weight of the instrument, the change in the cephalic curve, and some alteration in the mechanical arrangement of the screw in the handle. (Plate XVI., Fig. 93.) The instrument, thus modified, is far more manageable than the cephalotribe, and even than the common forceps, as the blades are narrower. The name "*compressor cranii*" has been adopted as indicative of its mode of operation. The whole weight of the instrument is three and three-quarters pounds. The proper *blades*, or cephalic portions, are without fenestræ, as in the brise-tête, and are six inches and five lines long, and one inch and five lines broad; the extremities are rounded, and the exterior convex and well polished. The pelvic curve is lessened, and a perpendicular line drawn from the upper edges of the points of the blades to a horizontal surface, upon which the instrument is placed, measures three inches; the cephalic curve is similar to that of the author's forceps, so that when the handles are closed the points are in contact, and the greatest breadth, measured from their outer convex surfaces, is one inch and nine lines, and is nearer to the shanks than to the points, the former distance being two inches and three lines, and the latter four inches and three lines. Hence the blades, when closed, can be passed through an orifice measuring two inches by one inch and five lines, and include

an oval space. The inner surface of the blade is smooth, but quite concave from one edge to the other, contributing by the projection of the margin of the blades to prevent any slipping of the instrument. The danger of slipping, however, is chiefly counteracted by the peculiar form of the cephalic curve as above described, causing the whole head, when compression is made, to glide more and more within the grasp of the forceps, till even the points project, in some instances, beyond the chin.

The *shanks* are thick and strong, and diverging from the joint, terminate at the distance of three inches and five lines in the cephalic portions. The lock is formed of a pivot, half an inch in length, strongly riveted into the left branch, and surmounted with a very broad, flat button, an inch and a quarter in diameter. The right branch is furnished with a mortise for the reception of the pivot, as in the English forceps. The flat surfaces of each blade, at the joint, measure about two and a half inches, by one inch in width. These surfaces, in conjunction with the broad button of the pivot, prevent any disposition of the blades to twist when compression is made, and thus maintain the parallelism of the blades.

The *handles* are nine inches and six lines in length, each one being flat, and slightly tapering from the joint toward its extremity, where they measure seven to eight lines in width, but toward the joint, about eight or nine lines, and three lines in their thickness. These flat surfaces are roughened.

At the lower extremity of the left handle is attached a screw, four and a half inches long, fixed by a pivot, and is made to pass through a large opening, or foramen, at the extremity of the right handle. It may be convenient to have a slit in this foramen, so that the screw may be turned in or out at pleasure. A movable nut with female screw, and furnished with three projecting handles an inch and three quarters in length, is adapted to the male screw, so that, when the screw has been passed through the opening of the right branch, the nut will act as a powerful screw and lever, to close the blades, and make any requisite degree of compression.

The *Compressor Cranii*, being made of strong steel, well tempered, is unyielding, and capable, under the influence of the screw, to compress any foetal head at term, so that its transverse diameter should measure but two inches. They are as effectual, therefore, as the heavy brise-tête of Baudelocque, while, being lighter and of smaller size, they can be handled with much more ease and precision. They can, indeed, owing to the narrowness of the blade, be applied with more facility than even the forceps.

In operating with the compressor cranii in a case, for example, of deformed pelvis, the blades are to be introduced separately wherever there is most room, and as near as practicable to the sides of the child's head, but, of course, never directly toward the pubis or sacrum. The male blade must be introduced first, and then the female blade on the opposite side; this can generally be done with facility. The practitioner should take care, if possible, to insert them so deeply that the points of the instrument should reach the face of the infant, in order that the whole head should be subjected to pressure; otherwise, after compressing the cranium, it may possibly be requisite, if the deformity be great, to loosen the instrument, and re-apply it so as to embrace the facial extremity of the head. Being carefully applied, pressure on the handles will be sufficient to determine whether the instrument is properly located, and whether the tissues of the mother are not within its grasp. The screw, then, may be employed, and very slowly tightened as the vault of the cranium yields, and as the top of the head becomes more and more projected below the blades into the pelvis. When the compression is completed, it will be advisable, especially in those cases where the blades have been applied to the sides of the pelvis, before making any traction effort, gradually to twist the forceps, so as to approximate the blades to the sacrum and pubis. The effect of this manœuvre will be, to bring that diameter of the head, which has been diminished to two inches, in the direction of the shortest diameter of the superior strait; for it is manifest that, if the blades of the compressor be applied to the sides of the pelvis, they will have a tendency rather to increase the size of that portion of the head intervening between the pubis and the sacrum; while, by turning the instrument, and, with it, the head, the smallest diameter of the cranium will correspond to that of the superior strait. This being accomplished, the instrument may now be used as a tractor and lever, slowly and carefully, in causing the descent of the head, precisely as delivery is effected by the forceps.

Great care should be taken, as the head passes over the perineum, that this tissue is not injured by undue pressure from the head or from the extremities of the blades, which may, when the compression is great, be found projecting beyond the chin.

Where the deformity is great, especially at the lower part of the pelvis, after the compression of the head has been completed, and after it has descended to the floor of the pelvis, it may be advantageous, by means of the craniotomy scissors, to remove the upper portion of the head which projects below the margin of the blades, taking their convex edge as a guide for

the course of the scissors; thus, much less space will be occupied by the head, and less pressure made upon the vagina, the rectum, and perineum. This may be the more necessary, as the cervico-bregmatic diameter, which corresponds to the coccy-pubal, is augmented during the compression.

Chailly, Cazeaux, Dubois, etc., indeed, most of the Continental accoucheurs, sanction the use of the cephalotribe, as very generally being far more safe and efficient than the crotchet and craniotomy forceps. All such hooks and pincers, says Chailly, are completely banished from obstetric practice, and Cazeaux declares that the cephalotribe may be safely used wherever there are two inches in the antero-posterior diameter of the pelvis, and that, therefore, it is to be resorted to in all cases of embryotomy; for where the short diameter is less than two inches, the Cæsarean section is demanded.

In this country, however, such powerful instruments are rarely demanded, as great deformities are seldom encountered by the American practitioner. In ordinary cases of craniotomy, delivery may easily be effected by the forceps, by which, when the head has been perforated, the transverse diameter can be readily diminished to two and a half inches, and the head be so securely grasped that any degree of tractile power required may be employed in the direct line of the axis of the obstetric canal, and, of course, to the greatest mechanical advantage. Dr. Rigby, in England, and M. Cazeaux, in France, have also recommended the obstetric forceps, as tractors, in cases of embryotomy.

But whatever modifications the instrument may require, the great fundamental principle now urged upon the profession, that the diminution of the size of the child's head should be accomplished by instruments acting as compressors, and not by the bones and soft tissues of the pelvis—as must be the case where tractors of any kind are employed—is not to be forgotten in any case where cephalotomy has to be performed.

This principle being acknowledged, the operation of craniotomy will be divested of half its terrors; perforation and compression, each of which can be very easily and safely performed, embrace all the important peculiarities of the operation; traction being securely effected, as in the common operation of the forceps. The patient thus escapes all those varied dangers arising from the slipping of the crotchet, the breaking up of the bones of the cranium, and the removal of sharp broken fragments of the bones, by means of hooks, osteotomist, cranioclast, etc., and especially the terrible contusion and laceration of the tissues and viscera of the pelvis, which must result, to a greater or less degree, by dragging the child's head through the contracted passages.

Craniotomy is not to be confined, however, merely to cases of deformed pelvis; it is often demanded when the passages are obstructed by tumors, soft or bony, which cannot be removed.

It is also required in all cases of difficult and tedious labors, where it has been clearly ascertained that the child is dead. For although, in some instances, an un-mutilated child might be delivered by the forceps, yet the delivery will be far more rapid and much more safe to the tissues of the mother, if perforation and compression be previously resorted to. It need hardly be suggested that, in such cases, the greatest possible care should be exercised in diagnosis, especially as to the question of the death of the child. The best counsel should be summoned, and the greatest prudence be exercised, as, peradventure, a living child might be inadvertently sacrificed. For who has not met with cases where the child has been born alive in tedious labors, contrary to all reasonable expectation.

Embryulcia, as will hereafter appear, may be also justified in some cases of prostration of the mother from hemorrhage, protracted labor, cases of mal-presentation, etc. In the improved state of the science of obstetrics at the present time, the necessity of this terrible operation in such complications very seldom occurs.

From the observations now made, the operation for craniotomy may be resorted to in any case of tedious labor, at the discretion of the practitioner, where there is full and satisfactory evidence of the death of the child. If the child, however, be living, the resort to this operation cannot be justified, while there be any hope remaining for preserving the life of the child, as well as of the mother. Hence, the rule that has generally been adopted, that if there be three inches in the antero-posterior diameter of the superior strait, craniotomy should not be resorted to if the child be living, until at least every other measure, especially by means of the forceps, have entirely failed; and it is, in such cases, where the deformity varies from that of a standard pelvis to that where the short diameter is three inches, that the forceps, in modern times, has been so effectual in preserving the lives of many infants, which would otherwise have perished from neglect on the one hand, or from craniotomy on the other.

If, however, the deformity be below three inches in the conjugate diameter, and the patient arrived at the full period of gestation, craniotomy becomes justifiable for the sake of the mother; for a living child at term cannot pass through a pelvis so much contracted. If it be a twin, or if it be a premature infant, some time

may be allowed for the expulsive efforts of nature, or for the use of the forceps, before resorting to perforation.

If, however, the contraction of the short diameter of the pelvis be two inches, or under, then, as we have already mentioned, the Cæsarean operation is to be preferred, as affording a better prospect for the mother, while it has the strong recommendation of affording a good prospect of safety for the child.

The advantages and disadvantages of these two operations may be better estimated after gastrohysterotomy has been considered.

Before, however, dismissing the subject of embryotomy, it may be remarked that *pelvic* deliveries, in cases of deformity, occasionally require some special attention. Unless the deformity be great, the extremities of the child can be brought down by hooks, and then the body be delivered; if, however, the deformity be marked and the breech present, its size will have to be diminished before it can pass. Perhaps the best way of accomplishing this purpose, the child being dead, is by the cephalotribe or compressor cranii, applied so as to crush the bones of the pelvis. If this be not sufficient, there will be no great difficulty, after fixing the pelvis by hooks, to divide the tissues by means of craniotomy scissors, so as to effect the delivery of the extremities and breech. The thorax can easily be lessened in size by similar measures, and the arms be brought down. The greater difficulty will exist in reaching the head, which may be arrested entirely above the superior strait, and present its base, constituting one of the most difficult cases in obstetric practice. The accoucheur must be determined as to his course of action by the peculiarities of the case. Traction being made by the spine, the head may be so fixed that the practitioner may reach the posterior inferior lateral fontanel, and perforate it by means of a long trocar, or by the pointed craniotomy scissors. This perforation being made, and the brain, etc., being broken up, the head may be brought lower down; or the small hook may be introduced within the cranium, and act as a tractor, in depressing the occipital extremity of the head. This being accomplished, it would be best, in a very confined pelvis, to amputate the neck of the child; after which, by traction upon the hook, the occipital extremity will present very accurately at the superior strait. The compressor cranii can now be applied, and the head diminished sufficiently to allow of extraction.

If, however, after the body be delivered, the chin or face of the child could be more readily reached, the hook may be passed first to the nostrils, or to the orbital processes of the face, and thus flexion be

completed, and the chin made to present toward the centre of the strait. This being accomplished, the small hook, or crotchet, may be introduced into the mouth of the child, and fixed upon the posterior nares, by which the head can be firmly held at the superior strait. Then the compressor may be applied, so as to lessen the head, and facilitate delivery; or, if this be not at hand, some portion of the os frontis could be perforated, so as to facilitate the collapse of the head, which might be gradually broken up by means of the craniotomy pincers or forceps. In these cases, also, the whole operation may be facilitated, after the delivery of the body, by amputating the neck.

In these cases where the base of the head presents at the superior strait, Dr. Harlow's "Diaclast," might perhaps be advantageously employed so as to break up the base of the cranium.

Signs of Death of the Child.—Before dismissing this interesting subject of embryotomy, a few words respecting the signs indicating the life or death of the child in utero are demanded; inasmuch as, in many cases, the operation of craniotomy ought to be preferred if the child be dead, and it could not be justified if the child be alive.

The introduction of auscultation into the science of obstetrics, enables the modern accoucheur, very generally, to form a positive diagnosis of this question. This is the more important, as little confidence can be placed in most of those signs formerly adduced to prove the death of the fœtus.

The child may perish during pregnancy and before labor. This may be discovered by the diminution or cessation of the usual signs of pregnancy; the mammæ collapse, the uterus no longer enlarges, but, rather, diminishes in size, becoming softer and more flaccid, the motions of the child disappear, and the patient often feels lighter, more capable of moving about, and in better spirits. Sometimes, however, her spirits, especially if she be anxious to become a mother, are bad, and her general health is enfeebled. By auscultation, it can readily be discovered whether the pulsations of the fœtal heart, and, in some instances, also, the placental murmur, have disappeared; although, it is said this last may be perceived even after the death of the child.

If the infant be dead for some time before labor, it undergoes a process of softening or maceration in the liquor amnii. Hence, after delivery, the child is found blue, with desquamation of the cuticle, and flaccid, so that the bones of the cranium, and even those of the base, are movable. The softened condition of the tissues should be distinguished from putrefaction. There

is no fetor, no destruction of the tissues, where the ovum has not been ruptured so as to admit atmospheric air. Hence, also, women may carry such dead children for weeks, and even for months, without any bad consequences resulting.

During labor, when the child has thus been macerated for some weeks, the diagnosis can often be determined by portions of the cuticle coming away, and especially by softness of the head, and the mobility of the bones of the cranium. These signs, however, are not perfectly conclusive, inasmuch as Hamilton, Baudelocque, Orme, and Kennedy assert that desquamation of, and even sloughing of the scalp may occasionally be noticed, and yet the child be born alive; while the softness of the head and the mobility of the bones sometimes are met with in hydrocephalic children, who may still be alive.

Children more frequently die during the progress of labor. This event very generally results from the severe and continual pressure upon the placenta, cord, or body of the child. The signs of death, in such cases, as detailed by old authors, are unreliable, excepting positive evidence of the putrefaction of the infant.

No confidence can be placed in the loss of motion in the fœtus, coldness of the abdomen, want of pulsation of the brain at the fontanels, discharge of meconium, etc., as all these phenomena may, and often do co-exist with the living child. Practitioners now rely entirely on stethoscopic indications, and, in protracted cases, on the signs of putrefaction.

Auscultation is very important. If, therefore, the pulsations of the heart be distinctly heard in the early stages of labor, and if, subsequently, they gradually become more indistinct, and eventually disappear, there can be little doubt that the child has perished. Even in those cases where the practitioner is called late, and cannot, after careful examination, detect the cardiac sounds, he has good reason to conclude that the child is not living.

The author cannot, however, sanction the opinion, now generally urged by practitioners, that the child is certainly dead if these sounds be not heard; for there are many possible cases, in which the life of the child may continue when the pulsations of the heart are inaudible. For example, this is true when the fœtus is premature, when it is very feeble, when there is a large quantity of liquor amnii, when the mother is exceedingly corpulent, when she has ascites, and also in dorso-posterior positions of the fœtus, where the limbs are toward the anterior part of the uterus. Although, therefore, in most instances, auscultation would enable us to determine the important question, as to the life or

death of the fœtus, yet it must be received with some limitation, and, of course, the operation of craniotomy must not be hastily advised, because the cardiac sounds are not detected. This hint is of great importance to the young practitioner, and indeed, to all who are not skilful in this mode of exploration. The author has known a consultation, in which no one of three practitioners could perceive a pulsation of the heart, and yet, as the event proved, it was cor-

rectly recognized by a fourth physician, called to their assistance.

No positive dependence can be placed upon the presence or absence of the "placental murmur," as this sound is often inaudible from the peculiar position of the placenta, as it may possibly be confounded with the pulsations of the aorta, or of the iliac arteries, and, as it is said to continue, in some instances, even after the death of the fœtus.

CHAPTER XV.

OBSTETRIC OPERATIONS.—INSTRUMENTAL MEASURES.—GASTROHYSTEROTOMY.

THE *third division of Instrumental Delivery* includes all those operations performed on the mother in cases of difficult or impracticable labor, demanded for the preservation of her own life, and with some expectation of saving also her infant. They are generally very dangerous to the parent, and are only justifiable, therefore, where the practitioner has no other resource.

This division may be arranged under the heads of Symphysiotomy, Gastrohysterotomy, and the Induction of Premature Labor.

SYMPHYSEOTOMY.—In cases of contracted pelvis, where the antero-posterior diameter of the superior strait is so greatly diminished that a child at term cannot be born alive, and where it is not so much diminished but that the child might be preserved if five or six lines could be added to the sacro-pubic diameter, the division of the symphysis pubis, so as to allow the bones of the pubis to separate, and thus increase the space between the pubis and the sacrum, has been proposed as a comparatively safe operation for the parent, and as affording a well-grounded hope for the preservation of the child. It is often known by the name of the Sigaultian operation, as attention was first fixed upon it by Sigault, of France, an accoucheur, who promulgated this idea in his thesis, in the year 1773. The operation itself is not very difficult. The usual preparations having been made for a surgical operation, and the pubes being carefully shaved, the patient is placed on a narrow mattress and table, the shoulders much elevated, the lower limbs flexed and well supported by assistants,

while the nates are brought to the edge of the mattress. A catheter should be passed into the bladder to remove the urine completely, and should be allowed to remain to indicate the position of the bladder and urethra during the operation.

A longitudinal incision should be made through the *mons veneris* so as to divide the sur-pubic ligaments, the symphysis, and even the sub-pubic ligament. This being carefully accomplished, so as not to injure or touch the peritoneum, the bladder, or urethra, the bones of the pubis spontaneously separate for a half inch or more, increasing the space between the pubis and the sacrum. The practitioner now should hasten delivery, the os uteri being previously fully dilated, by encouraging the bearing-down efforts of the mother, or, if this be not sufficient, by applying the forceps, or resorting to version by the feet, hoping that the bones may sufficiently separate to allow the child to pass through the superior strait of the pelvis.

The child being born, and the placenta removed, the bodies of the ossa pubis at the symphysis should be brought into close contact, and maintained by a strong band properly arranged around the pelvis; the wound in the skin, etc., receiving the usual attention by sutures, plasters, etc. A bandage also should be loosely applied over the thighs, so as to maintain their adduction.

The patient is now to be placed in bed, and subjected to a proper regimen and medicines calculated to quiet irritation and pain, and to prevent inflammation and fever, with their usual consequences.

Symphyseotomy, although apparently plausible, and of no great difficulty in execution, has fallen into almost entire disuse, as the *objections* appear to be insuperable.

In the first place, by dividing the symphysis, but little additional space is gained for the child; for positive experiment shows that the bones of the pubis being separated for one inch, the gain in the short diameter of the strait is but *five lines*; and even were it practicable to separate the bones to the extent of two inches, which could not be done without positive injury to the sacro-iliac symphysis, there will be an additional gain in the antero-posterior diameter of not more than three lines.

This small addition would not contribute much to the space within the pelvis, and of course, therefore, would afford very little additional safety to the child.

These experiments have been made on the supposition that the antero-posterior diameter has been shortened simply by the projection of the sacrum; but it is well known that in many cases of deformed pelvis there is an approximation of the acetabular portions of the pelvis toward the spine, causing the bones of the pubis to curve inward, so that the horizontal rami and bodies of the pubis are sometimes nearly parallel to the extent of one or two inches. In such cases it is manifest, therefore, that a division of the symphysis would be still less advantageous; even if the bones were separated for an inch or an inch and a half, the child's head could not pass between the rami of the pubis; in most cases there would be practically no gain whatsoever.

This fact seems to have escaped practitioners in their speculations on the practicability of the section of the pubis.

In the second place, even if six or seven lines could thus be gained in the diameter, it would be impossible for the practitioner so exactly to estimate the relative size of the head and strait as to determine, after all, whether the child could be born alive; the patient, therefore, must be subjected to a dangerous operation, when the diagnosis is doubtful.

In the third place, after the division, the delivery must almost universally be artificial: the patient cannot powerfully exert the abdominal muscles in bearing down, as the bones of the pelvis constituting their *point d'appui* are no longer firm; hence the child must be subjected to the additional danger of delivery by the forceps or by podalic version. It is manifest, therefore, that very little expectation can be entertained, in cases of symphyseotomy, that the life of the child can be preserved.

In the fourth place, the division of the symphysis

necessarily involves the stretching or even the laceration of many of the pelvic tissues, especially in the neighborhood of the symphysis pubis, and those between the ilium and the sacrum.

Hence, in the fifth place, there is danger of inflammation ensuing in these important tissues, which is often of an acute character, and frequently deep within the pelvis; thence the danger of suppuration and abscesses, which, if they do not speedily destroy life, will be followed by ulcerations, and often by numerous fistulous openings; the discharges from these gradually exhaust the powers of the patient with symptoms of hectic irritation.

In the sixth place, these fistulæ will be kept up for months and even years, should the patient survive, by the indisposition of the ligamentous and cartilaginous tissues of the symphysis to reunite—their vital actions, and of course their recuperative powers, being very feeble. Indeed, reunion of the symphysis sometimes fails to occur; the bones remain movable and the patient unable to walk, even with crutches, for the remainder of her life.

These dangers, without referring to the injuries which may be sustained by the bladder and urethra, are sufficiently great to condemn the operation; although some patients have survived and recovered their health, and some children have been born alive. It is doubtful, however, whether these children might not have survived even if no operation had been performed, as the difficulty of ascertaining the relative proportion of the head to the pelvis prior to the operation is exceedingly great. Symphyseotomy, therefore, promises very little for the infant, and is very dangerous to the welfare or even the life of the mother.

The history of the operation, as detailed by experienced operators, confirms these deductions.

Introduced originally into France by Sigault, and having been successfully executed in a few instances, it attracted very universal attention on the continent of Europe, and its projector was lauded as a great public benefactor, and received many honors from scientific institutions. The popularity of the operation, however, was short-lived; the experiments of Baudelocque, in France, and Dr. Wm. Hunter, in London, soon substantiated the fact that not more than four or five lines could be gained in the short diameter of the pelvis when the ossa pubis were separated to an extent of one inch, and a greater separation endangered the integrity of the sacro-iliac symphyses. Hence, even allowing that the parietal protuberance might project a little between the bones of the pubis, not more than seven lines could possibly be gained by a division of the symphysis with any safety to the mother. As a

child at term could not be born where there was not three and a quarter inches in the short diameter of the pelvis, the operation in this point of view was not applicable to any case of deformity where there was not at least two and three-quarters inches in the antero-posterior diameter of the superior strait. Hence it must be limited to those cases of contraction comprehended between the above limits. Experience soon proved the truth of these observations: when the deformity was below two and three-quarters inches, the child very universally perished; while in cases of reputed success, the subsequent history of the patient often proved that the operation was unnecessary, as they bore living children afterwards without any operation.

The general result of statistics has proved that near one in three mothers perish, and about forty per cent. of the children are still-born. As regards the mother, this statement, although apparently favorable, when compared with the Cæsarean operation—where about one in two die—yet it is very unfavorable when compared with embryotomy, where hardly one in five die. Moreover, the recoveries in cases of symphyseotomy are very rarely perfect. The patient's health has been generally undermined by chronic inflammations and abscesses, by diseases of cartilages and bones, so that her life, after much suffering, is greatly shortened. In other cases, permanent lameness has resulted, while in but few has the recovery been complete.

After a careful examination of the history of the cases recorded, Baudelocque concludes that in an equal number of cases of deformity, the Cæsarean section will probably be more favorable to the mother and the child, than symphyseotomy. Dr. Dewees expresses a similar opinion, declaring the division of the pubis should be considered as dangerous to the mother as gastrohysterotomy. It is certainly also more dangerous for the child.

The high-wrought expectation that it would be a substitute for the Cæsarean section and for embryotomy has entirely vanished. Even on the continent of Europe it is very seldom resorted to, and it is said to have been performed but once in the British Isles, and probably never in America.

Before dismissing the subject, it may be stated that Mr. Imbert has thought the dangers of the operation might be obviated to a great degree by the subcutaneous section of the symphysis pubis; a strong narrow bistoury being carried underneath the skin, so as to divide the symphysis without any external communication. The idea is ingenious, but practically of no value.

Resection of the pubis has also been proposed by

M. Catolica, in 1829—the two rami of the pubis, superior and inferior, being divided on both sides. There is no satisfactory report of the operation having perfectly succeeded.

Professor Stoltz, of Strasbourg, has ingeniously suggested the subcutaneous section of the pubis by means of a narrow saw. This mode of operating consists in puncturing the mons veneris near the spine of the pubis, then directing a long needle, attached to the saw, through this opening along the interior surface of the pubis down to the inferior ramus of the pubis, the point being brought out between it and the crus of the clitoris. The saw is thus placed behind the bone, which may, therefore, be readily divided without injury to the skin. The bones will then separate to the desired extent. The orifice, it is said, will readily heal, and, eventually, a bony union will be re-established.

Another ingenious suggestion, founded on the known property of the periosteum to generate bone, has been made by Dr. Cristoforis. He terms it, "*resectio subperiosteæ*," and proposes to remove the pubic bones from their periosteum, hoping that they will be replaced by bony deposits. It is a difficult, if not impracticable, operation.

Such are some of the suggestions of learned men; but, as Cazeaux observes, they by no means obviate the strong objections against symphyseotomy, arising from the necessarily imperfect diagnosis, the injury to the sacro-iliac symphysis, the great fatality of the operation to the mothers and the children, and the wretched consequences, which usually follow, to the survivors.

GASTROHYSTEROTOMY—THE CÆSAREAN SECTION.—This operation essentially consists in dividing the parietes of the abdomen, and those of the uterus to such an extent as to allow the delivery of the child through this preternatural opening. We may thus preserve its life, and that of the mother, when delivery *per vias naturales* is impracticable.

It is an operation, however, easy as it may be in execution, fraught with danger to the mother, and, therefore, only to be justified by the absolute necessities of the patient. These dangers can be better estimated, after presenting an outline of the operation when performed under the most favorable circumstances by the skilful and scientific accoucheur.

The time or the period for the operation, is all-important, and should, if possible, be determined before labor. The accoucheur being consulted, and finding the pelvis deformed to such an extent that delivery by the natural passages would be improper, should at once advertise the patient and her friends of the unfortunate necessity existing for hysterotomy.

He should pay special attention to the patient's health, and carefully remove all sources of irritation, particularly from the stomach and bowels. He should calculate, as precisely as possible, what ought to be the full period of gestation, and request that he and his assistants should be summoned at the first indications of labor. The best time for operating, is after the os uteri is partially dilated, and before the membranes are ruptured. The reasons are evident. The os uteri should be partially dilated, so as to allow the free exit of the liquor amnii, perhaps of the placenta, and, eventually, of the lochial discharge. The necessity of operating before the os uteri is fully dilated, arises

First. From the importance of preserving the liquor amnii; inasmuch as this maintains the size of the uterus, and the child may be regarded as safe, prior to the rupture of the membranes.

Second. The child, also, will not be exposed, if the membranes be entire, to the powerful expulsive contractions of the uterus and abdominal muscles, by which it would soon be destroyed, as it could not escape through the contracted pelvis; and, hence, one important object of the operation might entirely fail, if too long delayed.

Third. These expulsive efforts, also, would depress and exhaust, if often repeated, the mental and physical energies of the mother; and would eventually be followed, if allowed to continue, by inflammation, fever, and prostration. Should the operation be performed under such circumstances of excitement or exhaustion, there would be little, if any, prospect of saving the mother, while the child would inevitably perish. Deferring the operation, therefore, to a late period of labor, has been, probably, one important reason why the Cæsarean section has so often terminated fatally to the mother and her infant.

On the contrary, if the operation be resorted to before the child or the parent have been injured by unavailing efforts at delivery, and especially before the membranes are ruptured, while the moral and physical being of the mother are in a good condition, and when there are no symptoms of inflammation, fever, or exhaustion, strong hopes may be entertained for the salvation of both the mother and her child.

The mode of performing the operation varies but little in the different cases; it was formerly customary to make the incisions on the side of the abdomen, toward the right or left iliac fossa; hence, the expression, the child in this operation was "taken from the side" of the womb. It was found, however, that many difficulties attended this mode, and now the incision is very universally made at the middle and inferior part of the abdomen. Suitable preparations

having been made, and the patient placed upon a mattress, on a narrow table, should be brought into an anæsthetic state by means of ether or chloroform. The bladder should be carefully emptied by a catheter, and an incision, beginning near the umbilicus, should be continued down over the linea alba to within about two inches of the pubis. This incision should be very carefully and gradually carried through the parietes of the abdomen, so as to expose the anterior surface of the uterus, while several assistants should place their hands over the superior and lateral portions of the abdomen, so as to keep the abdominal tissues in close contact with the uterus during the whole of the operation, in order that none of the contents of the abdomen should escape at the wound, and to prevent, as far as practicable, the effusion of blood, liquor amnii, etc., into the peritoneal cavity. The external incision is generally about six inches in length. Should any blood-vessel be cut, and continue to bleed, it should be secured. A cautious incision, about five inches in extent, should then be made through the uterus, so as to expose the membranes of the ovum. These membranes are now to be ruptured, according to some authorities, through the vagina and os uteri, but, according to others, at the wound, which, perhaps, is preferable, as it affords the accoucheur a better opportunity of manipulation with the child before the waters are fully evacuated. The only objection to this is, that the liquor amnii, probably containing some meconium, might be effused among the intestines. This, however, can, perhaps, be prevented by the firm pressure of the hands of the assistants, by the liberal use of sponges, and by the position of the patient. As the accoucheur ruptures the membranes, his hand is to be passed into the uterus, and version by the feet immediately effected. The lower extremities are to be extracted; and, if there be any delay at the shoulders, first one arm, and then the second, are to be brought out, and, finally, flexion of the head should be induced so as to facilitate its extraction. It should be remembered that, during this process of delivery, the uterus is rapidly contracting, by its tonic and expulsive actions, and hence the wound in the uterus, although, originally, from four to five inches in length, is rapidly diminishing, so that the arms or the head might be retained—and hence the necessity of a rapid delivery, and also of securing a favorable presentation of the head of the child, as it passes the artificial opening. As soon as the child is born, the hand of the practitioner should be re-introduced into the uterus for the extraction of the placenta; or, if this be not practicable, the placental portion of the divided umbilical cord is to be attached to a gum-elastic catheter,

and by it directed through the os uteri into the vagina, and thus externally, so as to assist the delivery of the placenta, through the natural passages.

If, on dividing the uterus, the surface of the placenta should be exposed, the practitioner should immediately pass his hand between the placenta and the internal surface of the uterus till he reaches the membranes, which are then to be ruptured, and the delivery effected as in the former case.

Great care should be taken to prevent, if possible, the exit of the intestines, or, if they should protrude, that no violence should be offered, and that no foreign substance should adhere to them, when returned to the cavity of the abdomen. The blood and liquor amnii should, as far as possible, be very carefully removed. The dressings should be similar to other cases of gastrotomy; no sutures should be applied to the wound in the uterus, as the contractions of the organ render it very small, and bring its opposing surfaces into contact. Sutures are, however, required for the external opening of the abdomen, and are to be strengthened by plasters, compresses, and, finally, by a binder around the whole abdomen. The patient must now be made comfortable, perhaps on the mattress where she was originally placed, or be removed carefully to another bed; and every measure adopted to secure quietude of mind and body, and prevent any nervous or inflammatory irritations; the bladder, for several days, should be frequently emptied by the catheter, the patient being forbid to make any straining effort.

The dangers of the Cæsarean section—an operation in itself by no means difficult of execution, and readily accomplished in a few minutes—are, however, very great, and can, perhaps, be correctly estimated from the outline thus given. The

First danger is from hemorrhage. This, *à priori*, might seem to be great; but, in practice, it is seldom verified. No large blood-vessels are involved in the incision through the parietes of the abdomen, and, if any vessel bleed more than is desirable, it can easily be secured. The wound through the uterus, interesting, as it must do, the large arteries and veins, developed as they are at the full period of utero-gestation, especially when the incision is made opposite the placental attachment, where are located the large venous sinuses of the uterus, threatens severe hemorrhage, which may, indeed, sometimes ensue. Nevertheless, it is often very moderate, in consequence, in the first place, of the regular contractions of the uterus, which are in progress, condensing the uterine tissue, and thus diminishing the size of the blood-vessels, and excluding the blood. This condensation, in the second place, is augmented by the scalpel of the accoucheur; the uterus, when cut, pre-

sents often not only a dense, but whitish appearance in its divided tissues. Hence, if the child be speedily delivered, and the uterine contractions be constantly excited, the hemorrhage is seldom dangerous, and, the child and the placenta being extracted, there is usually no more than the ordinary bleeding after labor.

The *second danger* is prostration. This is hardly to be anticipated if the operation be timely performed. But, if the patient be already greatly depressed by the continuance and severity of her sufferings, and by unavailing efforts to deliver herself, the operation, of course, may accelerate her exhaustion and death. This objection, therefore, is not so much against the operation as against delaying its performance.

The *third and imminent danger* is inflammation. Some inflammation must, of course, always ensue after a surgical operation, and in many instances, after the Cæsarean section, such inflammation is moderate, useful, and followed by no bad consequences—the patient recovering as after other incised wounds.

This, unfortunately, can seldom be expected; the subsequent inflammation is often inordinate, productive of bad consequences, and not unfrequently dangerous and fatal. There are several reasons explanatory of this unhappy result.

It is well known that all penetrating wounds into the cavity of the abdomen are peculiarly dangerous, as the local inflammation excited has a strong disposition to spread over the whole surface of the peritoneum. This continuous and extensive inflammatory excitement may arise even from small wounds; but is much more apt to occur where the wound is large, and hence frequently occurs in gastrotomy, and is more likely therefore to ensue in cases of gastrohysterotomy, where two large wounds are made through important tissues, necessitating two divisions of the peritoneum, one where it lines the abdominal muscles, and the other as it covers the surface of the uterus. Hence, there is the greater liability to severe inflammation after the Cæsarean section than in ordinary cases of gastrotomy. This liability is increased by any contusion which the wound may have sustained in the passage of the child or the hand of the accoucheur. It is enhanced also by atmospheric exposure, by the presence of foreign matters which may have adhered to the intestines when protruded, and more especially by the fact that very universally some liquor amnii, blood, etc., have been effused into the abdomen. This last danger is exceedingly aggravated by the atmospheric air also present; hence, the blood effused will very soon become putrescent and a source of danger not merely as an irritant, but as a poison which will be absorbed into the patient's system. It is comparatively rare,

therefore, that the inflammation in the neighborhood of the incisions will be circumscribed; it will usually become extensive, and make such demands upon the powers of life, that these become exhausted and the patient dies.

As regards the child, the danger also is great, but may perhaps be more readily obviated. There seems to be no good reason why the child should perish, if the operation be timely performed, before powerful contractions of the uterus have been instituted. If, however, the operation be delayed until the membranes be ruptured, the liquor amnii evacuated, and the child, its cord and placenta subjected to great pressure by uterine contractions, it may soon become partially or totally asphyxiated, especially if the operation be postponed for hours after the waters have been evacuated, and, of course, its recovery will be very doubtful, if not impossible.

The dangers of the operation from the causes just mentioned are so great that the professional mind still fluctuates as to the real value of this extraordinary mode of delivery. Its propriety or impropriety must be determined perhaps in some degree by theoretical reasoning, but mainly by the result of statistics.

Although this operation is very ancient, and, during the last two centuries, there have been numerous records of favorable and unfavorable cases, yet these have been so diverse that it is impossible to come to any very positive conclusion as to the real merits of gastrohysterotomy. Dr. Denman states that in his day nearly all the mothers perished who were operated on in Great Britain. Dr. Ramsbotham states that forty-five out of fifty die, or ninety per cent. are fatal. Dr. West makes the mortality eighty-three and six-tenths per cent.; while Dr. Churchill states that in seventy-nine cases, occurring in England and America, fifty-six mothers were lost, or about seventy per cent. In France, according to Baudelocque, twenty-four cases were successfully performed between 1750 and 1800. According to Velpeau, the mortality is one out of two, or fifty per cent. Chailly states the fatality to be five in six, or eighty-three and one-third per cent. Madame Lachapelle, in her excellent summary, states that this operation "so cruel, so often fatal," has been unfortunate in every case where it was performed "at our hospital." But she has, however, collected sixteen cases from the medical journals, where four only died, or twenty-five per cent. Sprengel, in his *History of the Cæsarean Operation*, mentions one hundred and six cases, where sixty-one recovered, and forty-five died, or a mortality of about forty-two and a half per cent.; while Baudelocque states that, out of seventy-three cases, forty-two resulted fatally, or fifty-eight

per cent. And Boer goes still further, and thinks that only one woman in every fourteen are saved; in other words, that the mortality is nearly ninety-three per cent. Cazeaux, in his admirable work, states that, making every allowance for the favorable and unfavorable cases published, the fatality of the Cæsarean operation amounts to four-fifths of the mothers; or the exact proportion on the continent of Europe, according to the excellent tables of Keyser, is seventy-nine per cent. Taking it for granted that many of the unfavorable cases are suppressed, the melancholy conclusion, says Cazeaux, must be made, that most of the mothers perish, and, therefore, that the operation of the Cæsarean section is only justifiable in extreme cases of deformity, where the life of the mother cannot be preserved by embryotomy. Neither does he think this conclusion invalidated by the fact that more than fifty per cent. of the children are saved—for most of these, as statistics have demonstrated, perish soon after birth, and very few attain their twentieth year. He eloquently adds, "The feeble and uncertain life of an infant, who is connected with the external world only through its mother, who, as yet, has neither thought nor affection, hope nor fear, can it be compared to that of a young woman associated with those around her by a thousand social and religious ties?"

In opposition to these sentiments of such high authorities in Great Britain and on the continent of Europe, it is still contended by some that gastrohysterotomy is justifiable in all those cases where the short diameter of the superior strait varies from two inches to two and three-quarters or three inches, *provided* the child be alive.

This is supported by Jacquemier, Busch, and Moser, which opinion has been endorsed, with great earnestness, by Professor Bedford, of the New York University. This last gentleman ventures to pen some severe criticisms on the moral, as well as professional, character of those, whose sense of duty might lead them to conclusions diverse from those of the Professor. The opinions of these gentlemen, and of many others, is founded upon the supposition that, although the mother might safely be delivered by embryotomy, yet she is bound to suffer an additional risk for the chance of preserving the life of her unborn infant. The high authority of Dr. Dewees, late Professor in the University of Pennsylvania, may, perhaps, be cited in favor of the Cæsarean section for the sake of preserving the child; for he observes, paragraph 1613: "From an attentive consideration of both of these operations, I am in favor of the Cæsarean operation whenever there would be an absolute necessity for the use of

the crotchet to the delivery of the child." It is evident, however, from his subsequent remarks, that he alluded merely to cases of "extreme deformity;" that is, where there was less than two and a half inches by three and a half inches in the passages; for, in such instances, he says: "In such a case we are persuaded that delivery by the crotchet offers an equal risk to the mother as the Cæsarean operation, with the absolute destruction of the child." Therefore, he argues in favor of the Cæsarean section, as thus, without increasing the risk to the mother, the child will be saved. No accoucheur can object to this conclusion; but Dr. Dewees does not appear to favor the operation in the case where a child is living, and where the short diameter of the strait is more than two and a half inches; for, in this case, embryotomy is far less dangerous to the mother than the Cæsarean section.

This, of course, is a very delicate question of professional ethics, and should be decided by the conscience of every enlightened practitioner under the influence of the past experience of the profession, the weight of authority, and the peculiar circumstances of each individual case. It is not to be denied that, at the present time, the predominant opinion in Europe and America is that gastrohysterotomy is an ulterior resort, merely for the safety of the mother; and hence, justifiable only when the short diameter of the strait is two and a quarter inches or less—as embryotomy, with this degree of contraction, would be, at least, as dangerous to the mother as the Cæsarean section. If the short diameter vary from two and a quarter to three and a quarter inches, embryotomy is to be resorted to, even if the child be living; and where the diameter is above three inches, or three and a quarter inches, every effort should be made for the delivery of a living child, by means of the forceps, or other measures, before resorting to the perforator.

We have no intention of invalidating the rules just detailed; nevertheless, as science advances, and as experience accumulates, all rules should be tested, and the effort made to render our science, even in such desperate cases, more successful in the preservation of the life of the child, as well as the parent.

Let it be observed, therefore, that the statistics respecting this operation are very imperfect,—not merely from the fact that the unfavorable cases are often excluded from the record, but especially, because the circumstances under which the operation is performed, particularly as regards the condition of the mother, the period of her labor, etc., have not been always fully stated. For example, in one of the most valuable statistical tables that has been presented, drawn up by Mr. Keyser, it is stated that, in one hundred and

sixty-four cases, the operation has proved fatal to the mother, in the proportion of forty to twenty cases, where the operation was performed within twenty-four hours; in the proportion of forty-one to thirty-four cases, when performed from twenty-five to seventy-two hours; in twenty-one to eight cases, when performed after that time. The same mode of statement has been adopted as to the fatality of the operation respecting the child. It is evident, that very little information is afforded as to the real stage or period of labor by this array of figures; inasmuch as, in one case, the first stage of labor might last for two, three, or four days, during all of which period the mother and the child might be in a very safe and healthy condition, while, in another case, the os uteri may be dilated in a few hours, the membranes may be ruptured, and violent expulsive contractions may exist, to the imminent danger of the child and its parent, before twelve or twenty-four hours have been exhausted. In this case, an operation might have been successful if performed within six hours after the commencement of labor, or fatal, if delayed six or twelve hours longer; while in the former case, the operation might be safely delayed even for days.

There is another difficulty in regard to statistics. In England, for example, where there is a great prejudice against the operation, and where it has been seldom resorted to, until every other measure, after long delay, has proved ineffectual, and where the woman is in a state of great irritation, local and general, or where her powers are actually exhausted, the Cæsarean section has been almost universally fatal to the mother and her infant. Of course, it is there seldom recommended, and never unless in desperate cases. On the continent of Europe, however, where it is more frequently employed, the success is said to be greater. One-fourth or, according to some, one-half of the mothers survive, and a larger proportion of children have been preserved.

It is very desirable, therefore, to obtain from reliable sources, especially from large hospitals, in different cities and counties, a detailed account of the exact circumstances in which the Cæsarean section has been instituted, and the results to the mother and child. Thus, an opinion might be formed of the success of the operation, when timely employed, and under favorable circumstances. Such statistics must be of slow formation, as the cases requiring this dangerous resort are comparatively few, and are becoming less numerous, as science advances, especially, as the necessity can, in many instances, be obviated, by having recourse to premature labor.

Theoretically, much might be said in favor of the

operation. Notwithstanding the dangers necessarily incident to gastrotomy, we know that it has been frequently performed with success, not merely in cases of hernia, but more especially for the removal of ovarian or other tumors in the cavity of the abdomen. Patients, also, have often recovered from punctured, incised, or even gun-shot wounds interesting the cavity of the peritoneum; and, in many instances, they have survived universal peritonitis, whether arising spontaneously, or resulting from accidents. And, finally, the undoubted recoveries of many patients after the Cæsarean section, all combine to prove that the operation is justifiable in cases otherwise desperate.

The hope, also, may be entertained, that if the patient be in a good condition mentally and physically, and if the deformity of the pelvis be ascertained previous to the occurrence of labor, so that suitable preparations can be made for the operation, gastrohysterotomy, will prove far more successful than in times past, and, perhaps, may be justified even in cases of moderate deformity, when the child is alive, for the purpose of preserving its life as well as that of its mother. Let it be remembered, however, that, in the present state of our knowledge, the practical rule, as laid down by English obstetricians and confirmed by the high authority of Cazeaux, justifies the operation only when the conjugate diameter is below two and a quarter inches, whether the child be alive or dead.

The Cæsarean section, in the United States, is rarely demanded, as deformities of the pelvis, to any extent, are not common in American women. Occasionally, however, such deformed pelves are met with, especially among foreigners who have suffered from diseases of the bones in early childhood. Delivery, in most of these cases, has been effected by the forceps or by embryotomy: but few women have been subjected to the Cæsarean section; and the accounts given of these are generally inaccurate and imperfect.

We cannot deny ourselves the satisfaction of detailing the outlines of the case of Mrs. R., in this city, to which professional attention was first called in 1831. The patient, born in Ireland, was twenty-two years of age, and about four and a half feet in height; she had a fall early in life, after which the bones of her pelvis became much diseased, but she eventually recovered her general health, and was married at about twenty-one years of age. Dr. Fox was called to see her in labor at term, Tuesday, June 14, 1831. Finding a deformity of the pelvis, a consultation was held with Dr. James, Professor in the University of Pennsylvania, Dr. Meigs, Dr. Physick, and others. After frequent examinations, it was concluded that there was very little more than two inches in the short

diameter of the superior strait, and therefore that a living child could not be born *per vias naturales*. The Cæsarean section was proposed, but was not only resisted by the patient, but by the influence and authority of the seniors in the profession, Drs. James and Physick. Embryotomy, although very unpromising, was then agreed upon. The perforation, however, was not made until five P. M. of Thursday, June 16th, when it was ascertained that the child was dead. The process of breaking up the cranium and removing the fragments of bones, including several of the bones of the face, was accomplished by means of forceps, crotchets, etc., with great difficulty, and not until a semiputrescent condition of the child had occurred. Final delivery was not accomplished until near two o'clock A. M. of Saturday, June 18th. The patient was greatly exhausted, and for some days the symptoms were very unfavorable.

In June, 1833, Drs. Fox and Meigs were again consulted in the case of Mrs. R. at term of her second child. Premature labor had been advised by the high authority of Dr. Dewees, with the approbation of the attending physicians. This, as well as the Cæsarean operation, being positively declined by the patient, embryotomy, after labor commenced, was resorted to by Dr. Meigs, who succeeded, in the course of two or three days, in accomplishing delivery by means of the craniotomy forceps, straight and curved, which he had devised, after experiencing the difficulty of breaking up the cranium by the crotchet in the former labor. The patient was not much exhausted, and speedily recovered.

In September, 1834, she again found herself three months advanced in pregnancy, and being anxious to have a living child, she consulted the late Dr. Joseph G. Nancrede as to the best course to be pursued. Dr. N. came to the conclusion that premature labor at seven months would promise nothing for the child where the deformity was so great as in the present case. All operations, therefore, were postponed until labor spontaneously ensued. Dr. Nancrede, after much reading and reflection, and conversation with medical friends, determined that if the child were dead at the commencement of labor, embryotomy ought to be resorted to; but if the child were living, the patient should be exposed to the dangers of the Cæsarean section, with a view to save the life of her infant.

On the 24th of March, 1835, labor commenced: at three o'clock P. M. on the 25th, Dr. Nancrede and Dr. Beattie, assisted by the advice of Professors Dewees, Horner, Gibson, and others, determined, as the child was living, to recommend the Cæsarean section. To this, however, the patient was very averse; but at

length, influenced by the statements of the physicians, and by the support of her ecclesiastical adviser, she consented to the operation. The os uteri was nearly dilated, and the membranes unbroken. The operation was performed by Dr. Gibson at five and a half o'clock P. M., and a living female infant was extracted in about ten minutes, somewhat asphyxiated, from which state she speedily recovered. After the section of the uterus, Dr. Nancrede made an unsuccessful attempt to rupture the membranes per vaginam. The liquor amnii was then allowed to escape through the wound, while the child was delivered footling. No untoward symptoms happened to the mother, and in a few weeks she was quite well.

It should be remarked that in this case the child presented the breech toward the os uteri, which circumstance would have been exceedingly unfavorable if the operation of embryotomy had been undertaken in this last labor, and might have prevented a successful completion.

In August, 1837, Mrs. R. was advanced in her fourth pregnancy to nearly seven months, and returned for advice to her former accoucheurs, Drs. Fox and Meigs. Premature labor was again deemed inadvisable, and the section of the uterus recommended at the full period of gestation. On the 4th of November, at about three o'clock, the liquor amnii began to escape; but as no pain was experienced, her physicians were not sent for till about seven A. M. of Sunday, November 5th, when the os uteri was found partially dilated, and the pains very decided. The os uteri was now nearly dilated, and strong bearing-down efforts had occurred, but it was evident that the child was still living in utero. The patient being properly placed, Dr. Gibson again made an incision in the original cicatrix with great caution, as it was found that there was a close adhesion between the anterior parietes of the uterus and the internal surface of the walls of the abdomen; the cicatrix being very thin. It was found necessary, however, in order to obtain sufficient room, to go beyond the cicatrix toward the umbilicus, so that the cavity of the peritoneum was again exposed, and some of the intestines escaped during the contractions of the uterus. When the opening was complete, Dr. Meigs introduced his left hand into the uterus, slightly separating the placenta, which partially presented, and succeeded in a few moments in delivering a strong male child, and afterward the placenta and cord through the opening. The child was asphyxiated, and fifteen or twenty minutes elapsed before respiration could be excited; but, however, it soon perfectly recovered.

Some twenty-six years have since elapsed, and we are happy to state that Mrs. R. is still living in the

enjoyment of tolerable health; the children have been strong and healthy; the daughter has been married and become a mother, and the son is an active, intelligent young man.

The most fortunate termination of this case to the mother and her children is certainly encouraging, and would seem to countenance the idea entertained by Dr. Nancrede that the Cæsarean section may sometimes be justifiable to save the life of a child even when previous labors have demonstrated that such women might be saved by the operation of embryotomy. But as already declared, the experience of the profession, even to the present time, will not sanction this principle, and the operation, therefore, as a general rule, is to be restricted to cases where embryotomy allows no hope for the salvation of the mother, and when of course hysterotomy is absolutely demanded for her safety.

The Cæsarean section has been recommended, and certainly ought to be performed, in cases of the *sudden death of the mother* at the latter periods of uterogestation—for as the child has a life in utero, to a certain extent independent of its parent, and as it may survive her death for a few minutes, or it is said even for hours, a section of the uterus speedily made may enable the physician to deliver a living child. The operation is always to be performed, however, with the same care as upon a living woman, as it is possible the appearance of death may have been deceptive, and the patient might possibly revive during the operation.

This proposition is agreeable to the old Roman law, which commands that women dying under the above circumstances should be opened, that "citizens might be preserved for the State."

Indeed, this seems to have been the first design of the Cæsarean operation, it being in ancient times almost restricted to women dying pregnant, and not performed, at least as a general rule, on living women until comparatively modern times.

The result of gastrohysterotomy in saving children after the death of the parent, has, however, not been very encouraging. Few authentic records exist of children being thus preserved. Much confidence cannot be reposed in the early histories of this operation.

VAGINAL HYSTEROTOMY.—There is another modification of hysterotomy, much more favorable in its results, than those just mentioned; it is termed Vaginal Hysterotomy, and consists in making a section of the uterus from the vagina in cases where the os uteri is obliterated, or where this orifice will not dilate or cannot be dilated by other measures. This, in cases of imperforate os uteri, or where there is great indura-

tion of the cervix or stricture of its canal, or fibrous, or cancerous tumors involving a portion of the neck—indeed, in all cases where the contractile efforts of the uterus, after a long trial, cannot effect a dilatation of its orifice, an opening may be made or the os uteri may be enlarged by a bistoury; one or more incisions being made through the thickness of the uterine tissues, being very careful not to wound the vagina or the peritoneal surface of the uterus. Such incisions should seldom, therefore, be deep, for under the pressure of the child's head the edges of the wound will yield, and some laceration will generally occur.

By this measure the life of the child may possibly be preserved, but nevertheless the prospect is not flattering, as the necessary delay before the operation, and the pressure to which the child is therefore subjected, and the necessity of delivery through a contracted orifice, will often involve its life. To the mother, however, it is far more safe than the Cæsarean section,—as experience has taught us that incisions of the neck of the uterus and even its laceration are not usually productive of dangerous consequences; provided, always, such solutions of continuity do not extend through the peritoneal tissues into the cavity of the abdomen. As it is impossible to say, *à priori*, to what extent these mechanical injuries will go, the operation per vaginam cannot, therefore, be regarded but as of serious import, especially also as such incisions and lacerations are made in morbid tissues.

It should be performed, therefore, only in cases of absolute necessity, as where, for example, the os uteri is *obliterated* or where the os or cervix are so indurated or diseased that *no dilatation* can be obtained by natural efforts, even after much time has been spent and all the usual measures for promoting relaxation have been faithfully tried. In the former instance, when the case is clearly made out, the incision becomes an absolute necessity for the safety of the mother and her child, and will often prove very effectual. Professor Bedford, of New York, relates two cases, in both of which the children and their mothers survived and no bad consequences resulted. In the first operation, in August, 1843, the child was rapidly delivered, after two incisions in opposite directions had been made. In the second case, in November, 1847, the labor proved to be tedious; two or three incisions had to be made at the expiration of several hours, and finally the child was delivered from the superior strait by the forceps, and yet did well.

In the second instance, where the os uteri still exists, but where dilatation does not occur, or is very imperfect under powerful uterine contractions, incisions might be justifiable. Much patience, however,

should be previously exercised, in the employment of the various medicinal or surgical measures to promote relaxation or dilatation, before resorting to the knife.

It is wonderful what nature will accomplish in very unfavorable cases, and how much such natural tendencies may be facilitated by remedial measures. A case occurred to the author, of labor with cancer of the cervix uteri. More than half the circle of the os, anteriorly, was very thick and unyielding, while the posterior portion, although thick, gradually dilated so that the os became sufficiently enlarged for a full grown male child to be delivered alive—the mother surviving some three or four months after parturition.

My friend Dr. Penrose has lately delivered a woman under very interesting circumstances. Dr. P. was called by Dr. Spooner to see a woman from the Philadelphia Dispensary who had been several days in labor; the whole neck of the uterus was scirrhus, apparently undilatable to any extent. The finger could be merely introduced within the orifice to a long contracted canal in the cervix. At the expiration of the eighth day of labor, the os uteri was dilated about an inch and a half, and the neck was considerably shortened, so that an infant could be recognized presenting the breech. Auscultation determined that the child was dead, but as the mother still had strength—her pulse being about one hundred—further delay was advised by the author, which met with the sanction of the physicians in attendance. On the following day, the ninth of her labor, the mother's pulse was one hundred and twenty, the labor pains less efficient, and her strength diminishing; while the fœtid discharges per vaginam indicated that putrefaction had commenced in the fœtus, of course aggravating the mother's danger. The os uteri was now dilated about two or two and a half inches in diameter, and was much softer.

Under these circumstances, Dr. Penrose undertook the delivery, by passing his fingers within the circle of the os uteri, as far as possible, and upon them directed a blunt hook to the pubic limb of the child, and succeeded, by means of the fingers and hook, in bringing down one leg into the vagina. Traction effort was then made, and, after some time, the hips and thorax were delivered; the arms, which were retained, were brought down, first one and then the other, by the blunt hook; the head presenting its base, was now detained by the contracted cervix; Dr. Penrose succeeded in passing a small blunt hook along the face of the child to the orbit of the eye, by means of which perfect flexion was produced, so that the chin was made to present, and the whole head delivered. There was no great degree of hemorrhage, and the patient did well. Dr.

Penrose will probably give a detailed account of this interesting case to the public.

A very instructive case of impracticable labor, not from induration of the os uteri, but from the presence of an enormous uterine tumor, some seven inches in length, extending across the cervix uteri, so as to prevent full dilatation of the os, and the descent of the child, even to the superior strait of the pelvis, is recorded by Dr. Keating, in the April number of the *American Journal of the Medical Sciences*, for 1861, and occurred in this city in 1858.

The patient, a fine healthy woman, had some symptoms of labor on the 28th of February. The following March 16th, labor ensued, the os uteri dilated slightly, so that, with difficulty, the finger could be brought into contact with the top of the head of the child. The external examination through the parietes of the abdomen revealed two tumors; but the diagnosis was so imperfectly made out by the physicians in attendance with Dr. Keating—Dr. Meigs, Dr. La Roche, and the author—that no efficient aid could be rendered. The liquor amnii had been long evacuated. Dr. Meigs succeeded in puncturing the head, and, by his craniotomy forceps, in breaking off a piece of the bone; nothing more, however, could be accomplished, the head being so high above the brim of the pelvis; the child became putrid, and the mother died. A post-mortem examination revealed the now contracted uterus, somewhat to the right of the spine, with the child, semi-putrescent, in its cavity, and the whole lower and anterior part of the abdomen was occupied by a tumor, involving the proper tissues of the uterus.

It is manifest in this case, that although under the imperfect diagnosis, the physicians were not justified in resorting to any serious operation, yet had the nature of the case been known, the only operation practicable would have been gastrohysterotomy, which would, in this case, have peculiar dangers, owing to the morbid mass involved in the tissues of the uterus. Still, however, it would have afforded a chance for the mother's safety.

Hysterotomy, either vaginal or gastric, may also be demanded, where, in addition to the strictures or contractions of the cervix uteri, there are also *strictures*, or partial or complete *atresia of the vagina*. Much, however, may be expected in these contractions of the vagina from the progress of relaxation, and subsequent stretching, from pressure of the head, which, with perhaps the assistance of the fingers or knife of the accoucheur, will be sufficient to accomplish its enlargement for the delivery. But, if the atresia be great, gastrohysterotomy may become the safer operation for the

patient, and the only one which can secure the life of the child.

There are, however, some strictures of the vagina, congenital or accidental, which are circumscribed to one portion of the vagina, where no thickening or induration of the tissues exist. The author met with one, some years ago, in a lady from North Carolina, who had been married three years, and had never conceived. On examination, per vaginam, a complete cul-de-sac was found to exist, about two and a half inches in depth, when the finger was arrested by a partition apparently complete, but, as the menses were discharged regularly, it was evident that there must be some orifice. This was eventually detected on the left side of the vagina, so small as only to receive the point of a common small-sized probe. It was readily dilated, so that the two portions of the vagina freely communicated, and the patient soon after became a mother.

In another instance, the author was requested to attend in a case of labor, where the patient had violent bearing-down efforts, but where no os uteri or membranes could be felt; there was a simple cul-de-sac, the superior part of which was bounded by a reflexion of the vagina, perfectly healthy, and natural in its tissue. In this membrane, or partition, no orifice could be detected by the finger, or by means of a probe. Labor was advancing rapidly, the head of the child could be readily recognized, per vaginam and per rectum, but still high in the pelvis. After some time, by keeping the finger firmly applied to different parts of the partition during the bearing-down efforts of the mother, a little dimple in the membrane could be detected. The probe was now pressed firmly on this spot or dimple, during the existence of a pain, by which a delicate membrane was ruptured, and the liquor amnii was discharged; the orifice was now readily enlarged by probes, forceps, and the finger; the child's head descended, and, apparently, without much injury to the tissue, was safely delivered; the mother did well.

The probability is, that this was also a case of congenital stricture of the vagina, furnished with a small orifice, through which the menses flowed, and which allowed access to the uterus, so that impregnation ensued. Afterwards, however, this orifice, from some cause, not evident from the history of the case, seems to have closed; although, it is possible, that the apparent closure was effected by the membranes of the ovum pressing firmly against this partition: yet, under this view of the case, the orifice ought to have been apparent during the absence of a pain, and the consequent collapse of the membranes; this was not the case.

CHAPTER XVI.

OBSTETRIC OPERATIONS.—INSTRUMENTAL MEASURES.—INDUCTION OF PREMATURE LABOR.

WE are exceedingly indebted, in modern times, to the English accoucheurs, for suggesting the idea that the life of the mother, and, in a great many instances, that of the child, might be preserved, in various cases of deformed or obstructed pelvis, where a child could not be born alive at the full period of gestation, by exciting labor one, two, or, perhaps, even three months before term.

This recommendation is based upon the well known fact, that children, prematurely born, may live and thrive. The numerous accidents, from internal and external causes, to which pregnant women are subjected, often excite labor,—generally with impunity to the parent, and often with safety to the child, provided gestation be sufficiently advanced. Technically, the child is said to be "*viable*," that is, capable of maintaining its existence out of the uterus, if born during either of the last three months of utero-gestation. Of course, the probability of its living will be greater, the longer it can be retained. Hence, a child born at the end of seven months is not so likely to live as those born at the eighth month; while those born at the termination of the sixth month of utero-gestation seldom survive. If the deformity, therefore, be great, so that delivery must be brought on at the beginning of the seventh month of utero-gestation, to ensure the safety of the mother, little hope can be entertained for the infant; but, if the deformity be not as great, so that the operation may be deferred to the end of the seventh month, considerable expectation may be indulged that the child and the mother will both be preserved.

The dreadful result of the Cæsarean section, of symphysiotomy, and of embryulcia, in cases of confined pelvis, so fatal to the mother and her child, might have excited, we should suppose, heart-felt satisfaction to the members of the profession, that such dangers to the mother might be entirely obviated, and that, in most instances, a far better chance be afforded for the child, by this simple, easy, and almost natural operation. Yet, strange to say, it was received with hesitation in

England, and opposed on the Continent, even by such men as Baudelocque, as being unnatural and immoral, violating human and Divine law.

These and other objections will be better understood after stating, more particularly, the character of the operation, the mode of exciting labor, and the results of past experience to the mother and her infant.

The necessity for the induction of premature labor arises, mainly, from a disproportion between the passages of the pelvis and the size of the head of the child at the full period of utero-gestation. At this time, it may be presumed that the bi-parietal diameter of the fœtus measures at least three inches and six lines, and, therefore, a living child can hardly be born, even by the aid of forceps, unless there be three and a quarter inches in the short diameter of the pelvis. Although it be true, that even well developed children may have been delivered alive, if there was only three inches in this pelvic diameter; yet such cases are exceptionable. Unless there be three and a quarter inches, the safe delivery of the infant is not to be anticipated. Embryotomy, or some other dangerous operation, would be the alternative.

The same declaration applies to other sources of obstruction than simple deformity; as, in cases of exostosis, of ovarian or other tumors in the pelvis, of indurated or contracted vagina, and in those, also, of permanent induration, thickening, or schirrus of the os or cervix uteri, or where there are fibrous or steatomatous tumors in the lower segment of the uterus, so located or so large, that the delivery at term would be impracticable. Also, it may be applicable in cases where successive pregnancies have demonstrated that the child is born dead, in consequence of the great size of the head, and its very complete state of ossification. In all such cases, when clearly substantiated, a child may be born alive, if labor be induced during the last three months of gestation, provided the deformity be not too great to allow an infant, at the end of the sixth month of gestation, to be brought forth without much delay or pressure.

To estimate, as nearly as possible, at what period labor should be induced, the practitioner should examine carefully,

First, as far as practicable, the degree of deformity or obstruction which exists; and,

Secondly, the usual length of the bi-parietal diameter during the last three months of utero-gestation.

The modes of measuring the degree of deformity of the pelvis will be detailed under another head. Let it be observed, however, that the finger is the best instrument for this purpose. In all supposed cases of deformity, therefore, such examination should be made, if possible, even in primiparous women, several months before the full period of gestation. In multiparous patients, however, the degree of deformity can be more accurately estimated, not only by an examination per vaginam, but, also, by the result of previous labor, in which hysterotomy, or embryotomy, or the forceps were demanded.

As regards the diameters of the child's head, the following tables, prepared by M. Figueira and Ritgen, will afford a proximate idea of the length of the diameters at the different periods of gestation; although great allowances must be made for the relative development of different children, the uncertainty of the exact period of conception, and, of course, of the stage of pregnancy, and for the flexibility or compressibility of the foetal head, so that a cranium apparently too large, may or can be often safely delivered.

Measurement of the bi-parietal diameter, according to Figueira:—

	IN. LINES.
At 7th month,	2 9
" 7½ "	3
" 8th "	3 1
" 8½ "	3 2
" 9th "	3 4

According to Ritgen, labor may be induced at the

	IN. LINES.
29th week, or 6½ months, when antero-posterior diam. is 2	7
30th " 6¾ " " " " " 2	8
31st " 7 " " " " " 2	9
35th " 8 " " " " " 2	10
36th " 8½ " " " " " 2	11
37th " 8¾ " " " " " 3	

Practitioners have generally restricted the induction of labor, with the expectation of saving the child's life, to cases of deformity varying from two inches and six lines to three inches and three lines in the conjugate diameter; inasmuch as the fundamental proposition is assumed, that a living child, at term, can be born, if there be three inches and three lines in the short diameter of the strait. To this restriction we must

object; for, although it is true that a child may be born alive at the full period, notwithstanding the deformity just designated, yet, certainly, this is a rare circumstance, and, therefore, ought not to be anticipated. Most children will perish under such conditions. We have no hesitation to say, therefore, that if the antero-posterior diameter of the brim be three inches and six lines, it will be justifiable to induce labor prior to the full period. It will be better for the mother, and far more safe for the infant.

Perhaps the general statement may be made, that a child may be delivered safely where the bi-parietal diameter of the head measures about the same as the short diameter of the pelvis, making allowances for the compressibility of the head, and bearing in mind that this compressibility is greater, the younger the fetus. Thus, at the full period of utero-gestation, if the conjugate diameter of the superior strait of the pelvis measures three inches and six lines, we may anticipate the safety of the child, especially with the assistance of the forceps. If, however, the antero-posterior diameter measures but three inches and three lines, labor may be induced at eight months, or even at eight months and two weeks, with a prospect of success. If we have but three inches, delivery should not be postponed after the eighth month; and if there be but two inches and six lines, labor must be induced toward the end of the seventh month, with a prospect of success for the child. If the pelvis should be less than two inches and six lines in diameter, and not under two inches, labor may, nevertheless, be excited at the termination of the sixth, or at the beginning of the seventh month, with a hope that the child may, possibly, survive; as many children have lived when born at the sixth month of utero-gestation.

By the above statement, a proximate idea may be formed of the circumstances which may demand and justify induction of labor prematurely.

The modes of exciting the uterus into contraction, so that the phenomena of parturition should be developed, are various: as,

Puncturing the Membranes.—This is by far the most certain and efficient measure; for experience testifies that in all cases, when, whether accidentally or artificially, the waters have been evacuated, the tonic contractions of the uterus immediately ensue, so that the uterus is reduced in size, and sooner or later the alternate contractions supervene—by which the os uteri is dilated, and the child expelled. The time, however, which elapses, varies exceedingly, from a few minutes to three or four days; often twenty-four hours expire before the regular pains appear; and sometimes, it is said, even one or two weeks; this, however, is

very unusual, as it is rare even for three days to elapse before labor is instituted.

The process in such cases is generally tedious, as the pains are often irregular, the cervix uteri not being fully developed, and the os rigid; the second stage, however, is comparatively short, provided there be no great disproportion between the head and the pelvis.

It is manifest that there are serious objections to this mode of operating; for the child, not fully developed, is at once exposed with its placenta and cord to the tonic contractions of the uterus, and subsequently, during the tedious process of dilatation of the os uteri, to its powerful alternate contractions, and of course, to the bearing-down efforts of the mother, during the process of descent. Hence, its life is endangered, and it may be seriously impaired, or even destroyed, by the pressure to which the infant is subjected during the first stage of labor.

M. Meissner, of Leipsic, has proposed puncturing the membranes toward the middle or upper part of the uterus; he operated by means of a canula slightly curved toward its extremity, and armed with a probe-pointed stilette projecting slightly from its orifice. This could be carried up between the membranes and the internal surface of the uterus, seven, eight, or more inches. The stilette is then to be withdrawn, and one with a trocar point introduced, by which the membranes can be pierced, and thus a portion of the liquor amnii be evacuated. The canula is then to be withdrawn. Labor will soon follow. The advantages expected are, as a portion of the liquor amnii remains, the child, cord and placenta will not be exposed to pressure during the first stage of labor, nor indeed will the membranes be ruptured at the orifice of the uterus as in ordinary cases of labor. It has, therefore, great advantages over the usual operation of puncture at the orifice of the uterus. M. Meissner says that in fourteen cases, both mother and child did well; nevertheless, there are some serious objections against this modification; as by the introduction of a canula so high up, a portion of the placenta may be detached from the surface of the uterus, thus exciting uterine hemorrhage from the patulous orifices of the venous sinuses; and the trocar, instead of puncturing the membranes, may puncture the placenta, and thus wounding the child's vessels, may give rise to a hemorrhage detrimental, if not fatal to the infant. An accoucheur operating in this manner, found that blood, and not liquor amnii, followed the use of the trocar, so that he was driven to the old operation of puncturing at the orifice of the uterus.

Hence, other modes have been suggested to induce labor, as

Secale Cornutum.—It is well known that this article, exhibited to pregnant animals, will often induce abortion, and hence its use has been suggested in the cases now under consideration. Many excellent practitioners have recommended it, and often found it successful. The objections, however, to its use are very strong: it is uncertain, and therefore the patient may be disappointed, or important time may be lost; and second, the contractions of the uterus which it induces are very powerful, protracted, and frequent—hence, during the first stage even, the membranes may be prematurely ruptured, and the child exposed to great pressure against an undilated os uteri; or even if the membranes be preserved until the second stage of labor, the contractions are so vehement and continuous, that its life will be greatly endangered, especially the passages of the pelvis, if they be comparatively small. We think, therefore, its use should be abandoned.

Mechanical Dilatation of the Cervix Uteri.—A safer mode is by mechanical dilatation of the os uteri, so as to excite the fibres to regular contraction. This may be done by the finger pressing against the lips of the orifice, and gradually inserted within the cervix. By repeating this operation carefully, and making slight pressure upon the edges of the os, contractions may be excited, or a sponged tent, as proposed by Kluge, may be inserted within the lips of the orifice, taking care not to injure the membranes, under the expectation that its gradual enlargement will dilate the orifice and bring on labor.

Mr. Barnes, after giving the history of the various means of inducing labor, recommends that the dilatation of the os may be best accomplished by small cylindrical caoutchouc bags, introduced within the cervix by means of a female catheter, or hollow canula, by which the bags may be dilated by air or water. He represents this plan as very efficient, and also as very speedy in its operation.

It has been *proposed* to dilate the os and cervix uteri forcibly by means of forceps and other dilators, such as Busch's three-bladed forceps. All this is reprehensible, as there is danger of causing contusion or even laceration of the tissues, which may be productive of inflammation and its consequences. The membranes also might be ruptured prematurely, and thus the child exposed to danger.

These operations, if, however, carefully performed, will usually accomplish the desired purpose with safety to the mother and child. There is some danger of rupturing the membranes, and also of irritating the os and cervix uteri; and some uncertainty of their efficacy.

Detachment of the Membranes.—The next mode

is to detach the membranes from the cervix and the lower part of the uterus to some extent. This may occasionally be done, simply by the finger passed through the os uteri, carefully extending it a short distance in a circular direction between the membranes and the internal surface of the uterus. It is best effected, however, by a curved gum-elastic catheter, or even by a metallic curved sound or probe, which may be passed to a distance of three or four inches within the uterus in different directions, care being taken not to press against the membranes. A little discharge of blood is usually produced from the detachment of the membranes, and labor generally ensues within a few hours, no painful irritation being excited by the operation.

To this mode of operating there is no special objection, as it is easily performed, and does not interfere with the safety of the child or mother—the only valid objection is that, in some few instances, a catheter might reach the placental attachments, and some unusual hemorrhage might ensue; this, however, even if it should occur, would probably not prove detrimental. Perhaps it will not always be successful, but it has several times succeeded in the hands of the author, and labor has progressed, as in ordinary cases of parturition.

Vaginal Injections.—Another mode has been introduced by Kiwisch, of Prague, who has suggested *douche* of tepid water into the vagina, and against the neck of the uterus, which may be continued for an hour or two at a time, and repeated three or four times per day. It is said in this way the contractions may be induced, and labor be excited after a few repetitions of the *douche*; sometimes after four or five, but, not unfrequently, until it has been repeated eight or ten times. Kiwisch's mode of operating is by means of a syphon, connected with a reservoir at the elevation of some ten feet; the same, however, can be more conveniently effected by a syringe, (as M. Eguisier recommends,) so constructed as to maintain a constant stream against the os uteri. Dr. Tyler Smith says that alternate douches of warm and cold water are more effectual. This operation is simple, and can hardly be productive of any bad effects, either to the mother or to the child. Indeed, the irritation is so trifling, that it is rather wonderful that uterine contractions could be thereby excited, and the probability is that, in many instances, it will entirely fail.

Uterine Injections.—Another mode has been suggested by Cohen, and received the approbation of many practitioners: it is to inject a small quantity of water through the orifice of the uterus, between the membranes and the internal surface of the uterus, so as to detach the membranes, and thus induce labor.

Seanzoni has suggested the use of carbonic acid gas, and Professor Simpson that of atmospheric air as a substitute for the water. Doubtless, this mode of operating may be very successful in exciting labor; but, certainly, it ought not to be recommended, as there can be no security that a separation might not also be induced between the placenta and the uterus, so that the whole ovum, even, might be detached, to the certain destruction of the child, and the danger to the mother of serious uterine hemorrhage.

Galvanism.—Galvanism and electricity, with their various modifications, have been proposed to excite the uterine fibres; they, however, are very uncertain and irregular in their operation, and, of course, cannot be depended upon, and may injuriously disturb the excited sensibilities of a parturient woman.

Colpeurynters.—Accoucheurs have been long acquainted with the use of the tampon or plug in the vagina, with a view of arresting uterine hemorrhage during pregnancy and labor. It was often perceived, moreover, that by it uterine contractions were induced or increased; hence, it has been suggested that premature labor might be excited by distending the vagina by portions of sponge, lint, etc. This has been successful. As a substitute, however, for the tampon, and as far more convenient, manageable, and, at the same time, comfortable for the patient, is the use of a gum-elastic bag, furnished with a tube, and connected with a syringe, so that water or air may be injected into its cavity, after its introduction into the vagina. Thus any degree of pressure requisite may be readily made, and increased or diminished at pleasure. This simple instrument, introduced by Dr. Carl Braun, of Vienna, and known by the name of "colpeurynter," affords us a very safe and excellent mode of exciting the uterus to contraction. It may not always succeed; but there seems to be no objection to its trial.

Emmenagogues.—It is well known that there are many remedies administered to females in cases of amenorrhœa, known by the name of emmenagogues, which have more or less direct effect upon the uterus; and when administered during pregnancy might produce abortion or labor. The various accidents to which women are liable, or even excessive fatigue, mental excitements, etc., may also determine uterine action; but all these ought never to be recommended with a view of exciting premature labor, inasmuch as it would be impossible to regulate the degree of excitement thus produced, and bad consequences to the mother and her infant might result.

Of all the means at our command, the most *effectual* is the puncturing of the membranes; but as serious objections exist to this mode of operating, it should be

the last resort of the physician. The injection of water, Kiwisch's method, or the colpeurynter, should always receive a fair trial; afterward detaching the membranes from the internal surface of the uterus, or dilating the os should be resorted to; while the ergot, for reasons stated, should probably never be employed.

Labor, being once excited by any of the means proposed, should be allowed to take its natural course; the accoucheur offering no other assistance than what the peculiar circumstances of the case may demand. The first stage of labor is generally tedious, but may be facilitated by relaxing measures, as formerly detailed. During the second stage, time should be allowed for the diminution and moulding of the head under the influence of uterine contractions, and the resistances offered by the contracted pelvis; occasionally, it may be requisite, in cases of mal-presentations, deficient flexion, rotation, etc., to afford necessary assistance, and sometimes even to apply the forceps, if the delivery be too long delayed.

Such are the modes of exciting premature labor, and such its nature and character.

VALUE OF THE OPERATION.—The results of professional experience, as stated by the latest authorities, are exceeding favorable; and the operation has gained favor, not only in England, but on the continent of Europe, where it has been extensively employed, and also in this country. It may be safely asserted, that to the mother there is very little danger; for, although cases are reported in which the mother has died, yet these are very few in number, and there is reason to believe, could always be traced to some accidental complication, arising from a bad constitution of the parent, the presence of some actual disease, or to unfortunate circumstances, in which the patient is placed. Under favorable conditions, as regards the health and strength of the mother, and as respects the timely performance of the operation, the degree of irritation necessary to excite the uterus to contraction is so slight that no evil can be anticipated to the mother. We may, therefore, join with Churchill in endorsing the assertion of M. Marinus, of Belgium, in saying, after enumerating a large number of cases, that "if these facts be true, it is established that females, undergoing this operation, incur no immediate danger." To the child, however, there must, necessarily, be more or less danger, arising from the simple fact, that it is premature, and, therefore, not perfectly prepared for a new mode of existence. In this point of view, the danger is greater the earlier labor is excited.

Another danger arises from the pressure often sustained during the first stage of labor, when the mem-

branes are, unfortunately, ruptured; and, in all cases, from the unavoidable delay and compression caused by the contracted passages of the pelvis. Hence, too much must not be anticipated for the child. Nevertheless, statistics demonstrate that more than one-half of the children have survived in premature deliveries, in cases of contracted pelvis.

This view of the results of premature labor, so safe to the mother, and so promising to the infant, that the lives of fifty per cent. of these unfortunates have been preserved, compare very favorably with any other suggestion yet proposed, in cases of labor with deformed pelvis. In embryotomy, for example, where all the children perish, and where the sufferings of the mother are exceedingly great and protracted, the dangers to her life, even when the operation is performed in the best manner and by the most skilful hands, are so great, that one in five is said to have perished; it cannot, therefore, be brought into comparison with the results of premature labor. Gastrohysterotomy, an operation of such acknowledged danger as to be the last resort of the accoucheur, confers no blessings on the parent comparable to those arising from the premature excitement of the uterus. In the one case, hardly one mother in two escaping death, while in the latter, that is, in the induction of premature labor, few, if any, ever perishing; while the chances in favor of the child are fully equal to those resulting from the Cæsarean section. If this statement be correct, it is impossible to estimate the great blessings conferred by the introduction of this new operation into the science of obstetrics. For it, we are indebted to the British accoucheurs.

In 1756, Dr. Kelly, of London, reports a consultation of the most distinguished accoucheurs of that city, upon the morality and feasibility of inducing labor prior to the full period, in a case of contracted pelvis. After much discussion, the operation was sanctioned, and performed with much success by Dr. Macaulay. Dr. Denman, who gives us this account, resorted, also, to this method, with more or less success; and although even in England, it was greatly resisted, yet, all opposition has vanished, and it now receives the support and recommendation of every intelligent practitioner. On the continent of Europe, the opposition, on moral and religious grounds, was greater and more persistent. Cazeaux informs us, that it was considered as a crime, and it was not until 1831 that it was first performed in France, by Professor Stoltz, no less than three-quarters of a century after this great improvement in obstetric practice had been introduced by British accoucheurs. The objections, however, have gradually been abandoned, and, although the operation is still less favored by the Continental than by the

English authorities, it receives the countenance of the best practitioners; and statistics, in all parts of the world, are confirming the propriety of the practice in suitable cases.

At the present day, it seems wonderful that any question as to its morality should have been discussed. The question was not whether the practitioner was to determine the life or death of the child in utero, where the mother's pelvis was deformed; but, what were the best means of delivering her and the child from existing danger; in other words, whether the parent and her infant would be safer by the induction of premature labor, or by resorting to gastrohysterotomy, symphysectomy, or embryotomy. This reduces the question to one of ordinary medical or surgical consultation, where

the welfare of the patient is involved in the decision of the practitioner. It is a choice of evils, and the obstetrician is, in duty bound, to choose the least for his patient. This is not a question, therefore, of morality, any more than any other question presented for professional decision. It is one for the exercise of a sound discretion, under a full knowledge of all the circumstances involved, and of the existing danger to the parent and her child; and, certainly, the decision in favor of the induction of premature labor in cases to which it is suited, must be readily and cheerfully rendered. We have no doubt that the British obstetrician has, by it, conferred a substantial benefit to man, and that thousands of lives of infants and their mothers will, by its means, be preserved.

Name of Practitioner.	Total No. of Women.	Total No. of Children.	Born alive.	Born dead.	REMARKS.
Dr. Denman, . . .	—	12	A majority.	—	Five of the eleven, born alive, died a few hours after birth.
Mr. Barlow, . . .	—	17	11	6	
Dr. Merriman, sen., . .	—	10	4	6	
Dr. Merriman, jr., . .	46	46	16	30	
Dr. Conquest, . . .	—	100	About half.	—	All the mothers recovered. There were eighteen mal-presentations; but only one child of these saved.
Dr. Gregory, . . .	1	1	1	—	
Dr. Collins, . . .	1	1	1	—	
Mr. Corry, . . .	—	—	All lived.	—	
Dr. Patterson, . . .	—	—	All lived.	—	Died subsequently.
Dr. Hamilton, . . .	21	45	41	4	
Mr. Moir and Dr. John Moir,	6	12	9	3	
Dr. F. Ramsbotham, . .	—	92	49	43	
Dr. Leo, . . .	31	31	12	19	The deaths can be readily accounted for. On 14 women, once; on 1, twice; on 3, thrice; on 2, four times, and on 1, ten times. Death of three not owing to the operation. Operated twenty times in all, and all mothers recovered.
Mr. Hearne, . . .	1	1	1	—	
M. Spöndl, . . .	1	1	1	—	
M. Ferrario, . . .	—	6	5	1	
M. Burekhardt, . . .	—	52	35	17	Of these, there were nineteen mal-presentations. All mothers recovered.
Mr. Kluge, . . .	—	12	9	3	
Mr. Solomon, . . .	—	67	34	33	
Mr. Siebold, . . .	—	3	2	1	
M. Mampe, . . .	—	5	4	1	In several, cruet necessary after labor was induced. Three mothers were lost.
Dr. Shippan, . . .	—	90	73	17	
MM. Velpeau and Kilian, .	—	161	115	46	
M. Figueira, . . .	—	280	166	114	

The foregoing table, taken from Dr. Churchill's copious statistics, exhibits, after deducting therefrom the indefinite statements made by Drs. Denman, Conquest, Patterson, and Mr. Corry, a total of nine hundred and thirty-three children; of which, five hundred and eighty-nine were born alive, and three hundred and forty-four born dead; being about sixty-three per cent. saved, and, consequently, thirty-seven per cent. lost.

In America, the extent to which this practice has been carried, does not fully appear; as practitioners have reported but few cases, while, without doubt, it has been frequently performed. Professor James, of the University of Pennsylvania, probably led the way in this country. In the year 1810, he operated in a case where, in two previous labors, delivery could only

be accomplished by embryotomy. In the third pregnancy, Dr. James and Dr. Monges determined, from the degree of the deformity of the pelvis, to induce labor at the end of the seventh month. This was effected; and a healthy female child was safely delivered on the 29th of June, 1810. It survived but twenty days, and, in the opinion of Dr. James, would have lived, if it had been carefully and judiciously nursed.

A case occurred to the author, in consultation with Dr. Warrington, of a young woman, whose height was not more than four feet three or four inches, with a deformed pelvis; the deformity interested the inferior as well the superior strait, owing to a projection of the sacrum, and an approximation of the bones of the ischia. In her first labor, which was premature,

Dr. Warrington succeeded in delivering her of a dead infant, by using the forceps, powerfully, as compressors. In her second pregnancy, she was introduced into the Pennsylvania Hospital, and, her general health being good, the author ruptured the membranes at what was regarded the eighth month of utero-gestation. The child was delivered, in some hours, without assistance, in a state of asphyxia, and proved to be but an infant of seven months. In the course of half an hour, respiration was excited, and the child and the parent did well. The author again had charge of her in her third pregnancy. Labor was induced in the same manner; but there was again an error on the part of the mother as to the period of her pregnancy, being, probably, about seven and a half months. The head of the child was rather more ossified than in the previous instance, and, although labor went on rapidly, there was so much resistance at the inferior outlet of the pelvis, that the forceps were applied. The child was born alive. The mother and her infant did well.

We have already stated the circumstances under which the induction of premature labor can be justified, on the principle of science and morals; and upon which, at the present time, there would exist but little difference of opinion. There are other questions, however, more debatable, and concerning which there may be a reasonable doubt.

We allude to those instances where there is little or no positive contraction of the pelvis, and where, from the *large size of the child's head*, and a *very perfect ossification*, death occurred during previous labors, and no other assignable cause could, after accurate observation, account for the uniformly unfortunate result. A mother is healthy, and all the physiological actions of labor are natural; the fœtus is well developed, healthy, and active in utero, until the second stage of labor has been well established, and although the head is large and ossified, yet delivery can be accomplished by means of the forceps, without resorting to embryotomy—the child, however, perishing.

The question, therefore, is whether, after repeated disappointment in such a case, it would not be justifiable to induce labor at eight and a half, or even at eight months, when the head would be smaller and more compressible than to wait to the full period; as prior experience would show that delivery could not be accomplished without the death of the child. And, still more, would it not be the imperative duty of the practitioner to recommend this operation as best for the mother, for her infant, and, of course, for the welfare of all parties interested, and also of society?

We have no hesitation in giving a positive affirmative to this important question, provided scientific and

experienced accoucheurs have investigated the peculiar circumstances of the case, and indicated the propriety of the operation.

The correctness of the principle, although its practical application may be difficult, is, to our mind, fully sustained by the history already given of this new operation. The mother, let it be observed, is seldom if ever in danger; the process of labor, although perhaps more tedious during the first stage, will be less severe and more rapid during the second, owing to the smaller size of the child, and no instruments, not even the forceps, will be required. To the child there will be every prospect also of safety: for although statistics might show that only fifty per cent. of children are usually saved, yet this includes all cases of premature labor artificially induced, even at the sixth month of utero gestation, when the child generally perishes; and also where the pelvis of the mother is deformed, and sometimes to a great degree; while in the present supposed case the disproportion between the head and the pelvis, even at term, is not great, and at the eighth month such disproportion would not exist. Hence, with the exception of the slight degree of irritation necessary to bring on the contractions of the uterus, the case might be regarded as one of natural labor, and the child would in all probability be saved as well as its parent,—parental hopes will be gratified and society be benefitted. This view has been confirmed by the fact that in many such cases the child has been saved by the *accidental* occurrence of labor before the full period. We perceive no valid objection to this operation, under the above circumstances; indeed, none have been brought forward except those which apply to every obstetric and surgical operation. In no instance can the result be certainly predicted; man is fallible, but it is his duty to exercise his best judgment in all responsible cases, and to do in all obstetric operations what he deems best for the safety of the mother and child—always regarding the welfare of the mother as paramount, but at the same time never forgetting that the child unborn is a perfect human being, entitled to the best efforts of the accoucheur to preserve its life. It is only when the simple question is presented whether the mother or child must die, that the practitioner can be justified in abandoning the life of the infant to preserve the more important one of the mother; but under all circumstances, his science and skill must be exerted in every case of labor, for the preservation of the lives of both parties interested. On these principles the induction of premature labor, under the favorable circumstances for mother and child, above indicated, is not only justifiable but imperative.

A very interesting case of this kind has occurred in

Philadelphia, in the person of Mrs. E., the wife of one of our intelligent and active physicians. Mrs. E.'s health has always been good; she is, however, short of stature, and with a pelvis rather below the average size. During her first labor she was attended by Dr. Charles D. Meigs, and was delivered of a dead infant at the full period, without artificial assistance. In her second accouchement she was attended by the late Professor Dewees, and delivered of a dead infant by forceps. In her third labor the author was requested to take charge of the case. The os uteri dilated rapidly and completely, the membranes ruptured, but the head remained at the superior strait, notwithstanding strong expulsive contractions of the uterus. The forceps were applied, effecting the delivery of a dead infant. The fourth labor was similar in its character and results. The fifth labor, was equally unfortunate. In her sixth labor the child was delivered from the superior strait by means of Baudelocque's forceps, and was born alive, but with considerable injury to the scalp from the pressure of the forceps, so that suppuration ensued after delivery. The child, however, survived and did well, but eventually, when two years of age, died, leaving the parents once more childless. The patient had still a seventh and an eighth labor, during which she was attended by the author, with the assistance of Drs. Meigs and Huston; every measure was adopted that could be suggested to promote relaxation of the tissues and diminish expulsive efforts of the uterus so as to facilitate delivery, but in vain; the child's head was arrested at the superior strait until brought down by the forceps, after it was dead. The mother in these eight labors did well; the process of parturition was active, the os uteri dilated readily, and the expulsive contractions were strong. The children were always large, and the bones of the head well ossified—even the anterior fontanel being of small size.

Mrs. E. being again pregnant, and having had but one living child after eight labors, was of course very anxious, as well as was her husband, that she should become a mother; the author, therefore, thought it his duty to urge the propriety of inducing premature labor, two or four weeks before the full period of uterogestation. To this project Dr. E. was favorable, but of course interested, both as a husband and a father, he left the important decision to his medical friends. A consultation was called, consisting of Dr. Chapman, Dr. Wm. Neill, Dr. Huston, Dr. Wm. Harris, Dr. Meigs, and the author. All these gentlemen were seniors in their profession, and experienced in obstetrics. The operation of inducing premature labor three or four weeks before term was discussed at length, and was

regarded favorably by all present with the exception of Dr. Meigs. The latter gentleman argued that as the patient had been delivered of one living child, this event *might* occur in her ninth pregnancy, notwithstanding the seven disappointments; that the operation of bringing on labor would not *certainly* preserve the child, and it would be dangerous to the mother, and possibly might be fatal. It was possible also that the child might present unfavorably, or it might be a pregnancy of twins; and finally, it was his opinion, that the death of the infants in previous labors was owing, not to the size or density of the head, but to "ergotic-like contractions" of the uterus; and from these reasons, it would not be right to interfere with the natural process of labor.

On the contrary, it was urged that notwithstanding the dangers which might *possibly* result to the mother or child, yet such apprehended dangers were not, as experience has demonstrated, greater than after ordinary cases of labor, as in all labors accidents may occur, and bad consequences to mother or child may follow; that in the present instance, such supposed dangers were far less than those which the mother had encountered in her previous labors, during which the head was delayed under the powerful contractions of the uterus, and the head had to be delivered by forceps from the superior strait. Although it was true, as Dr. M. suggested, that Mrs. E. might have a living child at this ninth labor, at the full period, yet woful experience had taught that thus far the probability was in the proportion of one to eight, while in premature deliveries through all the most unfavorable cases, the children were saved in more than one out of two cases, and that even a far larger proportion of children lived when labor was not induced until the eighth month, and where the deformity was not great; hence, the probability was in favor of a living child in Mrs. E.'s case, almost as great as in a case of natural labor.

As to the possibility of an unfavorable presentation of the child, there would be in the present case no special difficulty in altering the presentation or facilitating the delivery as in common cases of parturition; and even if it were a twin pregnancy, labor induced at the eighth month would probably be safe for both children, especially as experience tells us that in twin pregnancies labor is apt to occur prematurely.

The main objection, however, urged, was that the cause of death depended on "ergotic-like contractions" of the uterus, and not on the comparatively large size and ossified character of the head. This objection, after all, is a mere matter of opinion, and directly contrary to that of the author, who was present in six labors

out of the eight. The contractions of the uterus during this second stage were strong, it is true, but not stronger than was natural in healthy women under similar circumstances, and not stronger than every accoucheur has witnessed as continuing for many hours without causing the death of the child. They ought not to be termed "ergotic," inasmuch as they were not so prolonged, neither did they return so frequently as when contractions are excited by the *secale cornutum*. The intervals were decided, and the continuance of the pains were not greater than ordinary.

But granting for a moment that the contractions were very powerful and persevering, why was not the child born? This is the simple question — thousands of children have been safely delivered when real, powerful, and almost unremitting contractions were produced under the influence of ergot, where there was no disproportion between the head and the passages. Why was this not the case in the present instance? There was no resistance from the os uteri, no contraction or tension of the vagina or the perineum, the presentation always was favorable, and the physiological action of the patient excellent: why then, we again ask, was not the child born? There can be no answer given, we think, to this plain common-sense practical question, than that the head was proportionally too large and unyielding. This fact is confirmed by another of great importance, that the head in all the six labors attended by the author was arrested at the superior strait of the pelvis, through which it could not, and did not pass, until the forceps were applied. This fact was so evident in her sixth or seventh labor, that although it had been previously determined in consultation to avoid instruments, trusting the patient to her own efforts, and favoring relaxation by a good bleeding, and diminishing the powerful contractions by the exhibition of opium, yet nevertheless Dr. Meigs and the author were both forced to the conclusion that the forceps were necessary to bring down the head.

The conclusion, we think, is inevitable that it was the condition of the head, and not any peculiar or powerful contractions of the uterus, which was the real cause of the unfortunate results of these different labors. To our mind, the whole of this reasoning is fully substantiated by the results of this ninth pregnancy of Mrs. E. On the 29th day of August, 1843, thirteen days after the consultation, and at least twenty-one days before her full period, Mrs. E. took a long ride over the turnpike, in a light vehicle, and, before reaching home, found herself in labor. Her physicians were sent for. Her pulse being full and strong, and the os uteri but partially dilated, venesection was resorted to. The dilation went on regularly, so that, after but

about four hours of labor, the bag of waters had protruded far into the vagina, and the head covered by the uterus had passed the superior strait. The bag of waters was left undisturbed, and did not rupture until it had protruded at the vulva, when the head was found upon the perineum, and, in a few moments, was delivered. The child survived, and is still living. The accident of a fatiguing drive excited in this case the premature labor, resulting, as in normal cases, favorable to mother and child. And we cannot conceive why it would not have been equally favorable if it had been induced by gentle artificial means, certainly far less severe than a rough drive of twelve miles over a turnpike.

We think, therefore, that the principle of inducing premature labor, where there is a disproportion between the size of the pelvis and head, should not be confined to cases where the fault is merely in the pelvis, but be extended to those cases where the head is in fault, where it is too large, or unusually ossified, as determined by previous experience. Under this supposition it is not applicable to primiparous labors; indeed, it should be restricted to those few instances where two, three, or more labors have proved unfortunate from the above cause. The propriety of the operation should always be carefully investigated by competent and experienced practitioners before coming to a decision on so important a question.

It has been objected to the induction of premature labor that the presentation may be unfavorable, and that such presentations occur more frequently than at the full period of utero-gestation. All this may be true, and, while it enhances the dangers to the child, it does not entirely destroy its chance for living, especially as such presentations may be rectified, and delivery may be assisted, as in other cases of mal-presentation; while, as regards the mother, for whose sake, chiefly, the operation is undertaken, it affords no argument against its performance.

Another case, said to demand the induction of premature labor, is where a woman has, in several pregnancies, been delivered of still-born children during the latter periods of utero-gestation, where the cause of death has existed in the *placenta*; this organ being found *diseased or disorganized*. It is thought by Professor Simpson and others, that in a succeeding pregnancy the child might be saved, if born at an earlier period, and the operation, under these circumstances, is said to have succeeded. The propriety of this advice is exceedingly doubtful. Children are often born alive where the placenta has been diseased, showing that the placental functions may not be seriously interrupted, unless its tissues be very universally disorgan-

ized. Experience also proves that diseases of the placenta, and also of the infant, may often exist in one, two, or more pregnancies, and yet healthy children may be subsequently born. As the diagnosis, therefore, must be very doubtful, indeed, almost entirely hypothetical, and as the induction of premature labor, especially as early as the sixth month, promises little for the infant, its employment can, we think, very seldom be justified. Cases of its reputed success might have terminated favorably if gestation had not been interrupted.

Another accident may occasionally demand premature induction of labor, viz., the presence of a *dead child* in utero. This, however, can be justified in a very few cases, inasmuch that most women, after the death of a child, during pregnancy, are more comfortable than previously; many of the distressing symptoms of gestation vanish, and, in some instances, the patient feels perfectly well, and able to discharge her ordinary duties without difficulty. There are cases, however, where nausea, vomiting, pain, and other nervous symptoms continue to torment the patient, even after the demise of the infant. If the death of the foetus be, therefore, fully ascertained by competent and experienced physicians, labor ought to be induced for the comfort and welfare of the mother; no good, but much evil would result from the prolongation of gestation.

There are, also, accidents occurring during pregnancy which may justify its arrest: *retroversion of the uterus*, for example, continuing after the fourth month of pregnancy, and altogether irreducible, renders it necessary to produce abortion; the mother's life would be jeopardized by the continuation of gestation, by the irritations excited by the uterus during its further development, and the child, even if alive at this period, must eventually perish.

Uterine hemorrhages during gestation, especially in cases of placenta prævia, if excessive, may justify the induction of labor, when it is evident, after due consideration, that the mother would otherwise perish. Upon these points we think there is no material difference of opinion among accoucheurs.

The induction of premature labor has, however, been resorted to in cases of far more doubtful character, even by well instructed and experienced physicians. These may be comprehended under the general declaration, that where, from debility or disease of the mother actually existing, or where there is good reason to apprehend that her life will be jeopardized if gestation continue to the full period, then parturition should be induced prematurely, in order to secure the more important life of the mother. This idea has

been carried so far that delivery has been brought on even in the earlier stages of pregnancy, necessitating, therefore, not merely the *risk* of the child's life, but its *death*, as in the earlier months it is not "viable."

There are very many cases of disease of the mother to which this question is applicable. A woman, for example, has suffered from puerperal convulsions in former labors, or she has a series of convulsions during her pregnancy. She has serious diseases of the lungs, of the heart, or of the brain. She may have aneurism of some of the large blood-vessels, or she may be exhausted by profuse evacuations; or her constitution may be so delicate that her friends and even her physician may feel doubtful or even persuaded that she cannot safely pass through her pregnancy and delivery; or she may be very much exhausted by the continuance of nausea and vomiting, so as to induce fears that her life might be lost, if pregnancy continued. It is under these and many similar states of disease that physicians have the painful decision to make whether the child ought not to be sacrificed with a view of preserving the life of the parent. The question has been ably debated by learned men in Europe and America, but no positive principle has been yet laid down for professional guidance.

The French Medical Institute of Paris decided that the child's life ought not to be destroyed in most if not all of the cases supposed. To this conclusion the author has no hesitation in giving a full assent. There may be exceptions, but the principle or rule of practice should be, that under such circumstances, where a living child exists in utero, the mother and the practitioner are bound to run the risk of the death of the parent rather than destroy that of the child. The reasons for this opinion are strong.

First. As regards the risk of the mother's life, this cannot, even by the wisest practitioner, be fully estimated. In very many instances patients have survived pregnancies and labor, and even enjoyed excellent health, when the prognosis was decidedly unfavorable; and even in cases of a very bad character patients have lived after their labors, as in aneurism, diseases of the heart, lungs, and brain.

Second. This argument is good even where there is a great probability of the patient's dying in labor from such diseases, because the danger will be nearly the same if labor was premature; and also it is impossible that such patients will live long, even if safely delivered, and it would not be justifiable, therefore, to destroy a healthy living being merely for the chance of prolonging for a few days, weeks, or months the life of a mother fatally diseased.

Third. The argument for non-interference is strength-

ened by two facts—the first is, that in the weak, emaciated woman there is so much relaxation of the tissues that labor is comparatively a short and easy process; and secondly, that the improvements of obstetric science, especially in facilitating the descent of the child during the second stage of labor, are so great that very little effort is demanded of the mother, and, of course, the bad effects of labor upon the system are exceedingly diminished. Artificial delivery by the forceps, for example, may so effectually prevent the necessity of any bearing-down effort on the part of the mother, and, of course, the disposition to congestion of the heart, lungs, or brain, that there will be comparatively little danger of aggravating any disease of these organs; and there will be no probability of producing effusion upon the brain, rupturing an aneurism, or a pulmonary abscess.

Fourth. Many of the cases supposed to demand premature labor are, however, mere functional disorders, and therefore not necessarily fatal, and often rapidly disappear with or without remedial measures.

Such disorders are exceedingly common during gestation, constituting what are called the “diseases of pregnancy.” The proper treatment for such disorders, as well as their natural tendencies and results, cannot now be portrayed. A few, however, may be cursorily noticed, so far as the present question is involved.

For example, the *nausea and vomiting* so common as a symptom, occasionally appears as a positive disease, or rather as continuing so long and being so inordinate as to produce great prostration and perhaps danger to the mother. To many this danger has been apparently so great that abortion has been induced for her preservation. We cannot venture to affirm but that in some instances this may be justified; yet certainly they must be exceedingly rare. For what accoucheur has not known vomiting continuing for several months almost constantly, and then suddenly disappearing, so that the patient in a few days becomes perfectly well? Indeed, in ordinary cases of pregnancy the sensations of exhaustion and prostration for a few hours may be so great as to alarm the timid, and in a few hours afterward the patient is bright and feels as well as her neighbors. So, also, nausea may continue for the whole nine months, and yet, as soon as labor is over, the woman appears to be full as well as if no such sickness had existed.

It seems to us, therefore, that the nausea and vomiting, of pregnancy, however depressing to the mind and body of the patient, and however apparently dangerous in the opinion of anxious relatives, can hardly be regarded as a serious malady; it is not an organic affection, but depends upon a disturbance

of the nervous system originating from uterine irritation, and therefore, like other nervous disorders, it is often transient, disappearing suddenly, and seldom, if ever, terminating fatally.

If this view be correct, the idea of destroying the life of a fetus to relieve the exhaustion from vomiting, cannot be defensible. Cases are, however, recorded, and practitioners affirm that they have met with such, which have proved fatal. This may be true; but we are not informed of the complications which may have existed in such cases; neither can it be clearly ascertained, whether the remedial agents employed—such as bleeding, cupping, leeching, blistering, emetics, cathartics, and mercurials—have not contributed to the sad event.

Again, *puerperal convulsions* having previously existed, or being threatened, are frequently considered as justifying the induction of premature labor.

The pathology of puerperal convulsions has never been satisfactorily established to the professional mind. At the present day, new theories have been broached, and, hence, changes in practice have occurred. These we cannot now consider; but, whatever may be the predisposition for such disturbances arising from pregnancy, certainly, it can hardly be denied, that mental and moral excitements, indigestion, giving rise to irritation of the stomach and bowels, and severe pain,—especially such as attends labor,—are among the common exciting causes of puerperal convulsions; and, also, that such causes are aggravated in their bad influences by the bearing-down efforts of the mother, inducing congestions of the lungs, heart, and brain, and, also, by any painful obstetric operation. If, therefore, a predisposition exists,—no matter whether this predisposition depends upon a deterioration or a poisonous condition of the blood or other fluids, or whether it depends upon an abnormal excitability of the cerebro-spinal system, connected with a plethoric state of the blood-vessels,—we cannot perceive the propriety, so long as such predisposition remains, of inducing labor, which, necessarily, implies pain, bearing-down efforts, and great mental and muscular excitements—all of which are among the most common and efficient exciting causes of this terrible affection. Certainly, the practitioner would be better employed by addressing himself, diligently, to diminish, as far as practicable, the predisposing causes, before the sufferings of parturition be excited. He should postpone, as far as practicable, the occurrence of labor, instead of hastening, prematurely, its advent. He should prepare the system so that it may safely endure a trial to which it must be eventually subjected.

It has been objected to this practice, that, as gesta-

tion is the cause of puerperal convulsions, the cause ought to be removed, and thus the danger terminated. We think that there is a great want of discrimination in this assertion. The presence of the child in utero is not an exciting cause of the convulsions; its presence, by keeping up the phenomena of gestation, acts simply as a predisposing cause. The predisposition may be diminished, and, perhaps, be effectually counteracted; but, if labor be induced, with all its severe sufferings and efforts, the most powerful exciting cause is applied at the very moment when the predisposition is strongest, and when the patient, therefore, should be preserved, as far as possible, from any moral or physical disturbance; then perfect quietude of mind and body is all-important. Judging from our experience—not very limited—in this form of disease, these views will be fully corroborated by careful observation. If they be correct, the argument against the induction of labor is exceedingly strong,—merely taking the mother's welfare into consideration; but, when we regard the question as involving the life of another human being, the inference seems unavoidable, that the life of the child in utero should not be jeopardized, because puerperal convulsions do exist, or may possibly exist, in any given case of pregnancy. We have always acted upon this principle; and have never countenanced, therefore, the induction of labor, nor, even after labor has occurred, the forcible dilatation of the os uteri, either by the hand or the knife of the practitioner: always considering every additional irritation of the kind as aggravating the excitement, already excessive.

This subject assumes a more serious aspect in relation to individuals who, from their natural temperament, or in consequence of previous disease, have become *weak, delicate, nervous*,—so much so, that, in cases of pregnancy, they and their advisers become fearful of the result to the mother. Of course, by the code of ethics, such women should not marry,—should not become mothers. But the professional question, nevertheless, will occur, whether gestation should be arrested under such circumstances. We, unhesitatingly, answer in the negative, for several reasons. First. Such debilitated patients, under a proper regimen, generally carry their children to the full period of utero-gestation with impunity, have easy labors, and have a "good getting-up;" while their children are often strong and healthy. In many instances, also, the physiological excitements of gestation are positively beneficial: the woman becomes stronger, the body more developed, and her health, for the future, greatly renovated. Second. It is impossible, for even experienced physicians, to decide what will be the result of pregnancy in any such supposed case of exhaustion;

and, therefore, it will be inexcusable to destroy the life of a child from any such supposed necessity. Third. This idea is enhanced by the fact that such patients, even when abortion has been induced, would frequently again become pregnant, and the demand would be made upon the practitioner to destroy, not the life of one only, but many human beings, for the sake of preserving the life of one woman, and that not from a positive, but from a supposititious danger. This cannot be justified upon any theory of moral responsibility. It approximates the horrible evil of criminal abortion, or the violation of the great moral law—"Thou shalt not kill."

ABUSE OF THE OPERATION.—This subject of inducing abortion, or premature labor, in consequence of the apprehension of patients or their friends,—supposing them to be conscientious,—has been greatly abused by the timid and ignorant practitioner, and, more especially, by the charlatan: this, perhaps, to an extent little suspected by the public. A lady of nervous temperament, the mother of several children, whose general health became feeble, resorted to a "water-cure establishment," where she remained some time. Not being much benefitted, she came, from Ohio, to the author, in this city, having been previously assured, however, by the head of the establishment, that she could never survive a pregnancy. She returned home from Philadelphia, much better, and, soon after, became pregnant, and, of course, much alarmed. Her homœopathic adviser gave, or pretended to give, medicines to produce abortion, which, failing, she again visited the author, beseeching him to save her life, by an operation for this purpose. Notwithstanding all his efforts to quiet her fears, and to exhibit the moral turpitude of such an act, she—although a lady of high standing and moral excellence—was so persuaded, under the influence of her empirical advisers, that she could not survive another pregnancy and delivery, that she again resorted to the "water-cure establishment," where an abortion was induced. A year or two afterward, she again became pregnant, went to her full period, became the mother of a living child, without any dangerous symptoms, and has, since, enjoyed better health than formerly.

Similar cases, we have reason to believe, are not infrequent, where intelligent and excellent ladies have their fears so excited by the declarations of ignorant or inexperienced practitioners, as not to perceive the heinous character of such transactions. Certainly regularly instructed physicians should never consent to the destruction of a human being in utero, unless from some extreme case, where all the circumstances have been carefully examined by competent authority.

It must clearly appear that the death of the parent must be inevitable, unless abortion should be excited, and also that her disease depends solely upon gestation, so that there will be a fair prospect of her recovery, if gestation be terminated.

As to the subject of "criminal abortion," as it has been justly termed, this is not the place for its discussion; it is one of those unnatural and horrible violations of human and divine law which cannot be too severely stigmatized, and which deserves condign punishment. It is the combined result of ignorance and wickedness, originating in a semi-civilized state of society, but, unfortunately, is still disgracing the annals of the most cultivated and refined nations.

We would not have it inferred, from the above observations and strictures, that abortion is not justifiable in cases of extreme deformity, clearly ascertained, where a "viable" child cannot be born. If the pelvis, therefore, measures but two inches or two inches and a quarter in its short diameter, we cannot suppose that a child at six months could be delivered. The question then arises whether the practitioner is justified in producing abortion, or whether it is his duty for the sake of the child to wait for the full period of utero-gestation, and extract the infant by the Cæsarean section. Of course, the question of embryotomy is not here concerned, as there can be no doubt, in every point of view, if the child must perish, it ought to be in the

early stages of pregnancy, when the mother would not be much endangered, than at the latter periods, when embryotomy will promise little or nothing for the mother. As to the Cæsarean operation, statistics, as formerly stated, show that it is so dangerous to the mother that it ought to be restricted to those cases of extreme deformity where embryulcia is not to be attempted; and, although by hysterotomy many children may be saved, yet this will not counterbalance the imminent danger to the parent. Hence, the conclusion seems unavoidable, in the present state of our knowledge and experience, that abortion is justifiable, in cases of great deformity, to secure the important life of the parent. In making this declaration we have the support of leading authorities in Great Britain and on the continent of Europe.

The objection presented by Merriman and others, that this principle might be abused by the ignorant or wicked, cannot be entertained; for such objections apply to all operations in surgery, and we cannot argue against the use of a good agent because it may be abused.

Neither, perhaps, should it be regarded as an objection that the accoucheur may be requested to induce abortion in the same woman in several successive pregnancies; for he cannot allow the female to perish under his eye when the means of preserving her life is in his power.

CHAPTER XVII.

DYSTOCIA.—COMPLICATIONS FROM FŒTUS.—LARGE HEADS.—MAL-PRESENTATIONS.

UNDER the various names of *preternatural*, *abnormal labor*, *dystocia*, may be included any deviations whatever, whether arising from anatomical, physiological, or pathological causes, which may interfere with the regular, natural process of labor, rendering it tedious or unusually painful and difficult, dangerous, or even impracticable; indeed, any complication, however slight, which may demand either medical or surgical assistance, may be advantageously arranged under this head. Nevertheless, labors are not usually regarded as complicated, unless demanding some positive assist-

ance from the practitioner. Parturition, therefore, may, in many instances, be simply tedious from slight rigidity, as in primiparous labors, or from too much or too little activity in the expulsive powers, yet, nevertheless, be regarded as natural labors; a little time and patience being only required.

The *first division of Dystocia or Complicated Labor*, includes, it has already been mentioned, (Table on Page 141,) various states of the fœtus, namely, large heads, mal-presentations, plurality of children, and deformities.

LARGE HEADS.

LARGE SIZE, OR OSSIFIED CONDITION OF THE CRANIUM.—Slight disproportion between the head and the pelvis, so long as the presentation is favorable and the physiological actions of the mother are in good condition, renders the labor tedious, and assistance is seldom demanded, unless the powers of the mother become inadequate to accomplish the delivery. Great attention, however, should be paid to ensure the regular occurrence of flexion, rotation, extension, etc., in a manner presently to be noticed; if, however, the delay be very great, and especially if the expulsive forces should diminish, assistance may be rendered by *medical* or *surgical* measures.

Medical measures include mild stimulating drinks, such as warm effusions, tea, coffee, mint, etc., as well as wine-whey, wine, brandy, and other alcoholic preparations.

An important agent, however, which has been employed to stimulate the failing efforts of the uterus, is the *secale cornutum*, or ergot. This, in doses of ten, fifteen, or twenty grains of the powder, exhibited during labor very generally, in the course of ten or twenty minutes, brings on powerful uterine and expulsive efforts. The characteristics of these ergotic contractions are not simply their power, but their persistence, and also the frequency of their occurrence. The bearing-down efforts are very strong, and rapidly returning, are proportionately painful, and disturb exceedingly the respiratory and circulatory systems; they become, however, very efficient, and by them, if the resistance be not very great, the child may be rapidly expelled. But if, as too frequently happens, especially in primiparous labors, the resistance be great, mischief, often of the most severe character, results from the exhibition of ergot. The child, being compressed between the resistance below and the power from above, has its functions, cerebral and circulatory, depressed, or even suspended, very little time being allowed for recovery during the short intervals of the pains. This compression extends to the umbilical cord and placenta, interrupting their functions, so as to induce, not merely a temporary asphyxia, but the actual death of the infant.

A few years ago, when in this city and throughout our country, the *secale cornutum* was the favorite resort of practitioners in tedious labors, so frequent were the number of still-born children, that many accoucheurs attributed their death, not simply to pressure, but to a poisonous influence of the diseased rye upon the infant. This supposition, however, cannot be true, as no poisonous influences have been observed upon the mo-

ther, and the anatomical and physiological connections of the child with the parent demonstrate that no such influences can extend to the fœtus; and moreover, after birth, no indications of poison has been noticed in the bodies of the child, whether it had been born alive or dead. There can be no doubt, therefore, that its death is simply owing to the degree and continuance of pressure on its organs.

The effects, arising from the exhibition of ergot in such cases, on the mother, are hardly less severe. These are due not merely to the increased suffering engendered, but also to the exhaustion produced by such violent and uniform muscular efforts, and the increased liability of serious mischief to the lungs, heart, and brain, from the disturbance of their functions. There is also danger of laceration, sometimes of the os uteri, more frequently of the lower part of the vagina, of the perineum, and even of the rectum—while in some instances lacerations of the upper part of the vagina, of the neck or body of the uterus have ensued, thus opening the peritoneal cavity, and allowing of the descent of the intestines and retrocession of the child into the cavity of the abdomen, very generally followed by hemorrhage, prostration, and death. As will be hereafter mentioned, the author has perhaps never met with a case of ruptured vagina or uterus in which the ergot had not been previously administered. Although these terrible accidents to the mother and child are not very frequent, nevertheless they have occurred so often, that the practical rule, now very universally adopted, is never to give ergot where there is any disproportion between the head of the child and the obstetric canal; indeed, in no case where there is so much resistance from any cause that a few strong bearing-down efforts will not be sufficient to accomplish delivery. Hence, ergot should not be exhibited when the head is large and well ossified, nor where there is much rigidity of the perineum, and therefore perhaps never in first labors; its use should be confined indeed to cases of multiparous women, where the vagina, perineum, and os vaginæ are greatly relaxed. Of course no well educated man would administer it in any case when the os uteri is not fully dilated.

Surgical measures, especially since our knowledge of the mechanism of labor has been so greatly improved, and our instruments been brought so much nearer to perfection, are almost universally to be preferred to the exhibition of ergot, or any other "forcing" medicine. In all such cases, when the os uteri is fully dilated, the forceps may be readily applied with little or no pain to the mother, whether the head be at the superior or inferior strait, or in the cavity of the pelvis. When once applied, the degree of power exercised with

them may be regulated entirely at the discretion of the practitioner; he can continue or suspend their action in accordance with the contractions and relaxations of the uterus, he can use greater or less force according to the emergency of the case or the degree of assistance still rendered by the expulsive efforts of the mother, and when the head is brought down to the perineum and orifice of the vagina, he can effect delivery as steadily and slowly as he wishes, in proportion to the degree of resistance made by these tissues. All this can be done by the judicious and experienced accoucheur with so much facility, that even in first labors there is no increased danger of rupture of the perineum, or of injury to the life of the child; indeed it may be argued and perhaps demonstrated, that there is less danger to the perineum and child in these cases of tedious labors, from large size of the head, than if the forceps had not been employed. There can be, at least, no doubt that in many instances, the child has thus been preserved, when otherwise it would have perished, and the dangers to the mother have been immensely diminished, especially as by means of the forceps the length of the labor and of course the duration of the suffering and the danger of the mother are greatly lessened.

In the use, therefore, of instruments, in these cases of complication, much judgment is required on the one hand not to allow the patient to be too much exhausted or the child's life too long endangered before resorting to their use; or on the other hand, they should not be too hastily employed before there is sufficient yielding of the os uteri, vagina, and perineum—for, of course, mischief may ensue to the tissues of the mother from prematurely or too rapidly distending them by the pressure of the child's head, as thus irritation, inflammation, and their consequences, might ensue. No positive rule can be laid down upon this subject; the experienced practitioner can generally form a correct opinion, while the inexperienced, not favored by the advice of one of the seniors in the profession, should be very careful in trusting not too much to his knowledge and dexterity, but much more to the wonderful resources of nature, while by various accessory measures he husband her strength and facilitates her operations. As no mother or her child should be allowed to suffer for the want of timely and scientific assistance, yet premature artificial delivery is bad.

In *presentations of the vertex*, complicated with an unusual size of the head, some modifications of treatment are requisite in several of the different positions. In the *first* and *second positions*, the practitioner, after the os uteri is fully dilated, can soon determine whether the head will be detained or not: if there be no disproportion, it will descend readily; as,

flexion existing, there is plenty of room for the transit of the occipital extremity of the head, unless the head be comparatively too large. If, therefore, there be detention, the practice of waiting for hours for the "moulding" of the head, until the life of the child, the tissues of the mother, or even her life are endangered, cannot be commended, although supported by the highest authorities in Britain, and even by many on the continent of Europe. We have had no hesitation, in the cases specified, in resorting early to the forceps, with a view of *facilitating* the passage of the head through the superior strait; neither have we had any reason to repent of this practice. We believe the tissues of the mother and her consequent welfare are far more safe than when subjected to the continued pressure from the head of the child for many hours, and from the powerful reiterated bearing-down efforts of the mother. We believe, also, that we have thus saved many children who would have otherwise perished, although, of course, in some instances, we have been disappointed, the child being still-born. In no case, however, have we known any serious injury inflicted on the urethra, bladder, or rectum.

In such cases the *secale cornutum* is of course inadmissible.

In these first and second positions of the vertex, should *flexion* be imperfect, this important change may be facilitated by the fingers or the vectis in the manner hereafter described.

Should *rotation* also be imperfect, and the head be therefore long delayed in an oblique direction, the lever will often be found useful in determining the occiput to the arch of the pubis, although its use might here be superseded by the forceps.

Should, however, the head descend transversely, and be arrested in the cavity of the pelvis with the occiput on one side, and the anterior fontanel on the other, we unhesitatingly recommend the lever to produce at least a partial rotation before the forceps be applied. We must disagree with those authorities who recommend the forceps when the head is thus transverse, inasmuch as one blade must be behind the pubis, greatly endangering the urethra and the bladder, and the other toward the sacrum, where the rectum also might be injured. The application of the forceps under such circumstances is a very difficult operation, and we believe never to be justified; partial rotation at least can always be produced by the vectis, after which the forceps, if necessary, can be applied *secundum artem*.

But in the *third position*, where the conjugate diameter of the superior strait is concerned, assistance will generally be required, even if the head is in due

proportion to the size of the pelvis, inasmuch as there is usually much delay in these positions. But when the head is large, and maintains this direct position with the occiput toward the pubis, it may be arrested. In the treatment of such cases, as soon as the diagnosis is determined, the practitioner should immediately, even before the os uteri is fully dilated, facilitate the natural disposition of the os frontis to slide off from the lumbar vertebra, so as to convert it into a first or second position of the vertex. On all ordinary occasions, if the patient be seen early, this can very readily be accomplished, simply by the finger alone. The index finger being carefully introduced within the os uteri, after the membranes are ruptured, may be passed, for example, over the right side of the occiput in the direction of the right branch of the occipito-parietal suture, and thus pressure may be made on the occiput from the right toward the left, that is, from the pubis, toward the left acetabulum, continuing this pressure during the existence of the pain. This, of course, gives an inclination of the os frontis from the spine toward the right sacro-iliac symphysis, greatly facilitated by the convexities of the head and spine; and thus the third is converted into a first position. If not immediately, generally it ensues after a few contractions of the uterus, and thus the whole difficulty of this third position will be obviated. If, however, the index finger be passed in the direction of the left branch of the occipito-parietal suture, the occiput can be directed from the pubis to the right acetabulum, and thus in the same manner conversion into the second position may be effected.

Should the patient not be visited until the os uteri be well dilated and the head arrested between the pubis and sacrum, although the same manœuvre may often be sufficient, yet more decided measures may be demanded, and the conversion just mentioned may be better effected by the whole hand acting upon the head, or by means of the forceps.

If the *manual operation* be preferred, the right hand should be introduced into the cavity of the pelvis, *secundum artem*, and brought into a state of supination; the fingers coming in contact with the head of the child, the hand may then be opened so as to carry the thumb to the right side of the head near the parietal protuberance, while the fingers are carried, on the left side, toward the left temple. Waiting then, till there is no contraction of the uterus and no bearing-down effort, the head can be gently raised upward in the direction of the axis of the strait, when, by means of the fingers, the face can be turned toward the right sacro-iliac symphysis, and be there retained until the contraction of the uterus fixes the head in what is now

the first position of the vertex. The hand may then be withdrawn.

If, after introducing the hand, the thumb should be carried toward the left parietal protuberance and the fingers toward the right temple, the same manœuvre may be accomplished, excepting that the forehead may be turned toward the left sacro-iliac symphysis, and thus the conversion be made into the second position of the vertex. It is to be observed in this mode of assisting, that the thumb, acting upon the occipital region and from one side, and the fingers upon the temporal region on the opposite side, operate together in facilitating the rotation of the os frontis from the promontory of the sacrum—the thumb turning the occiput in one direction, and the fingers the face of the child in an opposite direction.

To the practitioner, well instructed, it seems to be of no importance whether the right or left hand be employed; for if the rule just now laid down be observed, each of the manœuvres mentioned can be accomplished, either by the right or left hand, according to the convenience of the practitioner. Although many have thought it best to employ the right hand, if the conversion is to be made into the first position, and the left hand, if to the second position.

Should this mode of operating by the hand be impracticable, either from the fixed condition of the head at the superior strait, or from the contracted condition of the vulva and vagina forbidding its introduction, then the *forceps* may be applied to the sides of the child's head—when flexion is perfected—in the direction of the occipito-mental diameter, according to rules already given. (Plate XIX., Fig. 102.) Now, during the absence of a pain—a slight compression being made upon the head—it may be pushed up out of the superior strait and be converted, by turning the handles of the forceps, into the direction of the first or second position: delivery may then be easily accomplished.

Should, however, the head be so impacted that it cannot be elevated in the manner just mentioned, and should the child be alive, the practitioner will be justified, when the head is well flexed so that the posterior fontanel points toward the coccyx, to make an effort, by means of the forceps, to bring the head into the cavity of the pelvis, that he may accomplish the delivery.

Should, however, the impaction be very great, and especially should the child be dead, perforation is imperiously demanded for the safety of the tissues, and even the life of the mother; for it is always to be borne in mind that a large head ought not to remain long in the position just designated, as constant unyielding pressure, continually aggravated by the expulsive efforts

of the mother, is made by the head of the child against the urethra and neck of the bladder, and sometimes against the margin of the os uteri, so that contusion will be inflicted or the circulation interrupted. Hence, inflammation and sphacelation, followed by ulceration and destruction of the parts will ensue. Vesico-vaginal fistulæ are therefore too often the result of tedious labors. Let the remark be remembered, however, that such unfortunate accidents depend, as just intimated, far more frequently on the continued pressure of the child's head, than from the use of instruments. They result generally from the want, rather than from the employment of these valuable agents. That ignorant and unskilful practitioners have inflicted horrible and even fatal injuries, not only upon the mother but also upon the child, in operative midwifery, cannot be denied; but this fact constitutes no valid objection against the scientific and judicious resort to operations. Calomel and opium have slain their thousands, but what practitioner would neglect these invaluable agents? The abuse is no argument against the use of instruments. The author is perfectly convinced that in the usual routine of practice far more mischief has resulted from the neglect of instruments, than from their timely and judicious employment.

In the *fourth position* of the vertex at the superior strait, involving, even in natural labors, many delays and difficulties, assistance is much more frequently demanded than in the occipito-anterior positions. We have already laid it down as a fundamental rule that, in all cases of original fourth positions of the vertex, any disposition of the occiput to rotate on the right anterior inclined plane toward the pubis should always be *facilitated* by the practitioner. Moreover, in cases of decided fourth positions, where the anterior fontanel approximates the ramus of the pubis, and where the occiput is already acting upon the posterior inclined plane, giving it a direction toward the sacrum, the practitioner should *interfere* with this natural disposition of the occiput to rotate backward, and cause it to rotate forward, so as to convert this fourth into a second position, and thus gain all the advantages of an original anterior position. That this can be accomplished very universally, admits of little doubt; the author has no recollection of ever failing to convert a fourth into a second position whenever the operation was undertaken before the posterior rotation was complete.

Important as this indication is, it can very generally be effected, not only in natural labors, but even in such complications as we are now considering, simply by the *index finger*. When the head, for example, is descending, the os uteri being dilated, it is very easy for the

practitioner to carry his finger to the left temple, pressing it, as far as possible, toward the face. During the absence, and also during the presence of the pain, a firm pressure thus made will determine the os frontis from the pubis toward the left side, and gradually toward the posterior portion of the pelvis. This desirable change, although, perhaps, in the first instance, effected simply by the agency of the practitioner, will, as soon as the occiput strikes upon the spinous process of the ischium, be greatly facilitated by the action of the right anterior inclined plane; so that the occiput will be brought forward under the arch of the pubis. Of course, this attempt of the operator must be accomplished, not instantaneously, but gradually; pressure upon the os frontis being reiterated at every successive pain until the desired conversion is complete. No injury can be thus inflicted upon the child from the regular pressure of the soft finger of the practitioner; and, of course, there is no injury to the tissues of the mother, as they are not involved in the operation.

The only specious argument that can be advanced against this measure is the danger of injuriously twisting the neck of the child, inasmuch as the head is thus made to describe at least one-third of a circle; that is, from the foramen thyroideum to the hollow of the sacrum, as regards the os frontis; or from the sacro-sciatic ligament to the os pubis, as regards the occiput. The experience of Nægelè, and probably of every practitioner, certainly in unison with the uniform observation of the author, would show this danger to be more apparent than real, inasmuch that, after these conversions have been made, the child remains uninjured, respiration occurring as readily after birth as upon ordinary occasions. This safety of the child, no doubt, in many instances, arises from the fact, that as this forced rotation is accomplished gradually, the shoulders of the child rotate at the superior strait, to some extent, with the head. Hence, the twisting of the neck is not, in reality, so great as if the shoulders had not changed their position, so as to approximate nearer to the pubis and sacrum. Hence, when restitution occurs, after the birth of the head, the chin delivered over the perineum is brought simply to the thigh of the mother. There is, however, reason to believe that, in some instances, very little rotation of the shoulders with the head occurs. These original fourth positions have, by the author, been frequently converted into second positions, in cases where, on the escape of the head from the vulva, restitution has instantaneously brought the chin of the child toward the left groin, and the occiput to the posterior and right portion of the perineum, indicating that the twist in the neck had been very great, and that little or no rotation of the

shoulders had occurred; the head immediately resuming its original oblique position. This has been effected also with perfect impunity to the child.

Another mode of facilitating this rotation of the head, especially when the occiput is considerably advanced toward the pubis, is to pass the index finger over the top of the child's head, between it and the perineum, then curve it over the right or sacral side of the occiput, thus enabling the practitioner to draw the occiput forward to the pubis; this, however, is by no means as efficient as by the finger upon the temple, and is not applicable to the early stage of the process. When the finger is applied to the temple, its mechanical operation is very favorable, inasmuch as pressure may be considered as made upon the long arm of the lever, extending from the neck to the chin of the child, while the occiput, constituting the short arm of the lever, readily rotates in an opposite direction.

In more obstinate cases, if from the large size of the head, or if, from any other cause, the occiput remains so fixed, or manifests so strong a tendency to rotate posteriorly, that the finger may not be adequate to direct the occiput forward, rotation may still be effected by means of the *vectis* or *lever*. In this fourth position, therefore, the *vectis*, being introduced through the vulva into the cavity of the vagina somewhat toward the right side, should be directed obliquely over the top of the head, so that the cephalic portion of the instrument will have its concavity applied to the right side of the occiput. (Plate XIX., Fig. 103.) When in this position, the practitioner will have great command of the head, by making traction effort, and, at the same time, by depressing the handle toward the perineum, he may give a lever-like action to the instrument, of course taking great care that he does not make the soft parts of the mother a fulcrum, and, also, that the instrument does not slip on the convexities of the head. A little caution on the part of the educated practitioner will prevent any contusion to the mother or child, and even the infliction of pain—the mother ought not to be conscious of the operation, even when previously informed of its necessity.

The value of the *vectis*, in such cases, is very great; for by it rotation can, perhaps, in every instance, be effected, so as not only to prevent the usual delays and dangers arising from the occiput rotating to the hollow of the sacrum, but also the additional difficulties and dangers arising from the use of the forceps in these occipito-posterior positions. For example, when, in this fourth position, the head has descended into the cavity of the pelvis, and rotation does not occur, authors recommend the application of the forceps. This

instrument may, in some instances, be applied with safety to the child and to the tissues of the mother; but, in such cases, as rotation must occur posteriorly, in order that the pelvic curve of the forceps may correspond to that of the pelvis, it necessitates all the difficulties incident to the great flexion of the head, distension of the perineum, etc., in these occipito-posterior deliveries, which are aggravated, in the present complication, by the increased size of the head. Another great difficulty is, that the blades of the forceps can seldom be applied in the direction of the occipito-mental diameter, owing to the occiput being far back in the pelvis, and hence, as was formerly mentioned, the occipito-mental diameter is not exactly coincident with the axis of the superior strait; while the perineum, even when much relaxed, prevents the handles of the instrument being carried sufficiently far back toward the coccyx. Hence, the blades passing over the sides of the head will be found approximating the direction of the trachelo-bregmatic diameter, rather than that of the occipito-mental, and the points of the blades will often project beyond the base of the lower maxillary bone, endangering the sternum of the child, or even the umbilical cord, if this should be unfortunately entwined around the neck. It is difficult, also, to make traction in such cases in the direction of the axis of the superior strait, owing to the resistance of the perineum, pressing the handles forward. There is danger, also, unless the head descends readily, that the blades will rotate upon the sides of the head of the child, approximating more and more the trachelo-bregmatic diameter, and thus causing the top of the head, rather than the vertex, (Plate XXII., Fig. 116, and Plate IX., Fig. 55,) to approach the centre of the inferior strait of the pelvis.

Such being the objections to the use of the forceps in these cases, we must believe that they should be very seldom resorted to when the head is oblique in the pelvis. The lever has every advantage, there is no difficulty in its application, it is very effectual in producing anterior rotation, and thus avoiding all the delays and difficulties incident to posterior rotation. Hence, also, even where the head is so large, or the uterine efforts so inefficient that spontaneous delivery is impracticable, the use of the *vectis* is all-important to produce at least a partial rotation, when the forceps can be applied with ease and safety, as the occiput will now rotate under the arch of the pubis, when, as is universally acknowledged, delivery will be much easier, and, of course, safer for the child and mother.

The author having, in all such cases which have fallen under his notice, succeeded, in the manner above-mentioned, in effecting rotation previous to the

use of the forceps, cannot but believe that the application of the forceps in the occipito-posterior positions—whether the head be at the superior strait, or in the cavity of the pelvis, still remaining oblique—is seldom, if ever requisite. We know full well that in thus condemning the use of the forceps in almost every case of occipito-posterior positions, where the head is oblique, we are in opposition to the authority of the best modern accoucheurs, both in Europe and America. Even M. Cazeaux declares he has little confidence in the fingers or lever to produce rotation, and resorts to the forceps. Chailly says we have no means to effect rotation, but the forceps. Ramsbotham, junior, Churchill, Dewees, Meigs, and Bedford, appear to put no dependence upon the lever; and if rotation cannot be effected in these cases of arrest by means of the finger or hand, the forceps are recommended.

The vectis, from its acknowledged inferiority to the forceps, as a tractor, has, of late, been too much neglected. It is, however, a most valuable instrument, especially in promoting flexion, and also rotation of the head, and, in some instances, even as a simple tractor to effect delivery. As the author has very universally succeeded in effecting rotation by the lever, wherever the head has been arrested in original fourth and fifth positions of the vertex, he feels confident that the forceps should never be used in such cases, until the vectis has been judiciously and perseveringly employed. It can be used without exciting pain, and without any danger to the tissues of the child or mother, and will fulfil the most important indication of determining the occiput forward toward the pubis. The forceps, on the contrary, cannot be accurately applied; they necessitate very generally the rotation of the occiput backward, with all the consequential difficulties and dangers incident to the passage of the occiput over the coccyx and posterior perineum, aggravated, in the present case of complication, by the head being of unusual size.

Dr. Simpson, fully aware of these dangers, advises that even after the forceps be applied, the head should be rotated anteriorly until the occiput passes the plane of the ischium, when they should be removed and re-applied, so that the convexity of the edges should be toward the sacrum, and the anterior part of the head. And, although he has not employed the vectis, he imagines that it might be useful in such cases. M. Cazeaux, also, has, in bad cases, resorted to this conversion into an anterior position even when the occiput has already rotated to the sacrum; but he employed the forceps. The difficulties and dangers of such conversions by this instrument must be appa-

rent; all of which may be avoided by substituting the vectis.

The author was called in consultation with two of our most experienced accoucheurs, with the request to bring with him his craniotomy instruments. He found a young lady in labor with her first child, with the head oblique in the cavity of the pelvis, in the fifth position of the vertex, where it had been arrested for several hours; she was completely delirious from the severity and frequency of her pains. Auscultation proving that the child was still living, the extremity of the vectis was directed over the vertex, between it and the left sacro-sciatic ligament, and then by depressing the handle, the concavity of the instrument was brought over the sub-occipital region of the head. In a short time, the occipital protuberance was determined to the anterior part of the pelvis, then the vectis was removed, and the forceps applied. Both mother and child did well.

During the second and third periods of the second stage of labor, where the occiput has already rotated posteriorly, so that when the practitioner is called, the head has approximated, or is actually engaged *in the inferior strait* of the pelvis, it would be improper, if not impracticable, to attempt rotation anteriorly; the head should be delivered with the occiput toward the coccyx and perineum, either spontaneously or by artificial assistance.

Should any difficulty exist, the first effort of the practitioner must be to facilitate flexion, as far as practicable. This very important indication can often be fulfilled by pressure with the finger or fingers against the os frontis, thus directing the forehead and face of the child toward its sternum. This manœuvre may be greatly assisted by the fingers of the left hand directed toward the extremity of the coccyx, and, of course, toward the base of the occipital bone, as soon as the occipital protuberance has passed the coccyx. Pressure thus made against the sub-occipital region of the head will direct the vertex forward toward the vulva, increasing flexion, in perfect accordance with the natural mode of delivery. This pressure, to a certain extent, moderates the distension of the perineum, and, at the same time, gives to this tissue the best possible support, which is so imperatively demanded in these occipito-posterior positions.

As the occiput advances along the posterior wall of the vagina, approximating the anus and the anterior perineum, the distension of the perineum, and, of course, the danger of laceration or perforation, become more imminent, calling into requisition the best efforts of the practitioner. The fingers of the left hand should make firm pressure, in the manner just directed, over

the occiput through the medium of the perineum. Sometimes it will be found very advantageous, when the occipital protuberance has approximated the anus, to pass two fingers into the rectum, so as more effectually to "support" the posterior wall of the vagina, and, at the same time, to obtain more complete command of the base of the occiput, by which it will be more certainly determined toward the orifice of the vagina. Our experience indicates not merely the great efficiency of this mode of operating, but also its safety. With ordinary prudence, there is no danger of contusing the tissues of the rectum, and we have known of no evil consequences resulting from this practice.

In a great number of instances this mode of accomplishing delivery will be effectual; but if, from any cause, there is dangerous delay, flexion of the head may be facilitated very positively by means of the *rectis*. This instrument can be safely and readily introduced toward the lateral and posterior portion of the vagina to the base of the occiput. The handle of the instrument will then be found projecting from the vulva, somewhat obliquely; but, in some cases, it may be desirable to bring the extremity of the blade directly over the occipital protuberance, which will cause the handle to be parallel with the middle line of the perineum. When thus placed, traction can be cautiously made upon the occiput, and, as the os frontis is retained behind the arch of the pubis, this necessarily produces flexion, and, at the same time, facilitates the descent of the occiput to the vulva.

Another, and perhaps a more simple and equally efficient mode of increasing flexion, may be accomplished by means of a "*fillet*" or bandage around the base of the occiput, and so arranged as to traverse the head perpendicularly in the direction of the cervico-bregmatic diameter. (Plate XX., Fig. 106.) It is manifest that, by means of a fillet, acting in the direction just mentioned, force may be very safely applied to the head, and, owing to the resistance of the pubis against the os frontis, it will necessitate the flexion of the head, and the descent of the occiput along the perineum. Great care should be taken that the traction by the use of the fillet should always be made in the direction of the cervico-bregmatic diameter, and, of course, this direction will gradually vary as the head flexes, and the occiput descends; it being first downward, and gradually nearer and nearer to the pubis. If the traction effort, instead of being made in the direction of the cervico-bregmatic diameter, should be directed too much backward, the fillet would glide off from the occiput; if, on the contrary, the traction should be made too far forward, the fillet would act against the neck of the child, and be comparatively inefficient.

It is only when made in the direction of the cervico-bregmatic diameter that flexion and descent of the head will be facilitated. The use of the fillet, under these circumstances, is perhaps novel; a little reflection must, we think, convince any one of its simplicity and efficiency in these occipito-posterior cases, when the head is low down; the only practical difficulty, which may be of some importance, is in its introduction and application. A few suggestions may, therefore, be made:—

First. Perhaps the simplest mode is to take a broad ribbon or bandage, double it longitudinally, and then sew the edges of the middle or central third portion together. This may now be stiffened by the introduction of a gum-elastic bougie, a piece of thin whalebone, or thin hickory, or wire, etc., so as to form a flexible loop, which can be passed, after being well anointed, between the posterior wall of the vagina and the extremity of the occiput to its base, after which the stiffener may be withdrawn, leaving simply the fillet over the head.

Second. We have already recommended Bellocque's spring canula, as being very useful for conveying a fillet over the groin of the child, when requisite, in breech presentations. A similar canula, of larger size, will be equally efficient in carrying a fillet around the base of the head. The directions already given, as to the mode of its employment, need not be repeated.

Third. A fillet may also be conveyed over the head of the child by means of Gooch's Separable Canule, or by any of the ingenious instruments now employed for applying ligatures to polypi in the vagina or in the cavity of the uterus.

We are fully aware that "*fillets*," which in former times were so frequently employed in operative midwifery, have fallen into almost entire disuse; nevertheless, in the case just mentioned, and in a few others, to be noticed hereafter, the accoucheur who is familiar with the natural modes of delivery, can facilitate very efficiently and safely the passage of the head by means of this simple and ancient instrument. If the bandage be broad, and especially if that portion which is in contact with the head when traction effort is made, be well stuffed with cotton or wool, no injury can be inflicted on the tissues of the child or parent. A strong recommendation for its use arises from its being always at hand; the lever or forceps may be inaccessible, while a bandage of some material can easily be obtained.

The practice usually recommended in these posterior positions, when the descent of the head is arrested, with the occiput toward the coccyx and perineum, is to apply the *forceps*; and, should other means fail, they

should certainly be resorted to before we think of craniotomy. In these cases they can be more easily applied in a proper direction, (Plate XIX., Fig. 104,) and used with more efficiency, than when the head has not rotated, and is still oblique in the cavity of the pelvis. Nevertheless, the objections already mentioned to the use of the forceps in these occipito-posterior positions are, to a certain degree, applicable in the third and fourth periods of the delivery. Great care, therefore, is requisite to keep the blades of the forceps from moving on the head of the child, and in making traction directly downward toward the perineum, allowing the handles of the forceps to advance forward very slowly in proportion to the advance of the occiput toward the vulva, and paying also great attention to support the perineum and rectum by the fingers, in the manner already mentioned.

As the occiput approaches the os vaginæ, all action with the forceps should be slow, for fear of rupturing the fourchette; but as soon as the perineum passes over the occipital protuberance to the neck of the child, the handles of the forceps are to be rapidly depressed toward the coccyx, (Plate XX., Fig. 105,) so as to allow or even to facilitate the extension of the head, which now readily occurs, as detailed when speaking of the mechanism of labor.

In the *fifth position* the treatment is precisely the same, *mutatis mutandis*, as in the fourth position; that is, making allowances for the fact that rotation must occur in the opposite direction—the occiput now being toward the left sacro-iliac symphysis, instead of the right.

Thus, it being ascertained that the vertex presents in this fifth position, the first object of the practitioner should be the conversion of this fifth into the first position. This can gradually be accomplished, in most instances, by the pressure of the finger, in this case, against the right temple of the child—directing the anterior fontanel from the right acetabulum toward the posterior part of the pelvis, and thus inclining the occiput forward, so as to act on the left anterior inclined plane, and, of course, to determine it toward the pubis; or the finger, in some instances, may be carried backward over the left or sacral side of the occiput, to direct it forward. The vectis also may be employed in difficult cases, as in the fourth position, excepting after being carried obliquely over the top of the head of the child, it is to be applied to the left side of the occiput. Fortunately, this conversion can by these means be very generally accomplished, and thus the unfortunate necessity of using the forceps in these posterior *oblique* positions be prevented.

Should the practitioner find that rotation has already

taken place into the hollow of the sacrum, he should promote delivery by assisting the flexion and descent of the head precisely as in the former case.

The *sixth position* of the vertex, at the superior strait, as has been already mentioned, is exceedingly rare, and, although it may spontaneously disappear, yet the prudent practitioner ought always to *facilitate* the natural tendency to be converted into a fourth or fifth position. Owing to the convexities of the occiput and lumbar vertebræ, this conversion can generally be readily accomplished by the index finger, which, for example, can easily be carried toward the left temple of the child, directing it from the pubis toward the left, thus making the occiput revolve from the promontory of the sacrum or lumbar vertebræ toward the right sacro-iliac symphysis; or, if the finger be carried toward the right temple, pressure can be made from the pubis toward the right—thus inclining the occiput from the spine toward the left sacro-iliac symphysis, and converting the sixth position of the vertex into the fourth, in the one case, or into the fifth in the other. If the head should have descended so as to be completely engaged between the sacrum and the pubis, the same manipulation may still be effectual; if great difficulties exist, the alteration of the position may be accomplished either by the hand or by the forceps in a manner similar to that already recommended in the treatment of the third position.

It may be advisable, however, to add that few practitioners would regard it safe, after having made this conversion into the fourth, to attempt the conversion still further into the second position; or, if it had been converted into the fifth, to change it to the first position, as in all such cases, where the occiput had originally been recognized toward the sacrum, there would be danger of a fatal twist in the neck of the child, as the body might not rotate with the head.

The practical question on this point we do not deem to be settled. The author has, as already mentioned, known so many cases where the occiput has been rotated with perfect safety to the child, from the great sacro-sciatic notch to the arch of the pubis, and there are so many cases upon record where this rotation has been carried to a full semicircle with impunity, that he would have no hesitation, if a sixth had been converted into a fourth position, to attempt a still further rotation by well-directed pressure made with the finger or lever, so as to bring the occiput on the right anterior inclined plane to the pubis. Or, if it be converted into a fifth position, to determine the occiput by the same means, on the left anterior inclined plane, to the pubis. M. Cazeaux, for example, details a most inter-

esting case, already alluded to, where the forceps were applied to the head with the view of accomplishing delivery in the usual manner, bringing the occiput along the median line of the perineum. In this he failed. He then determined to effect rotation forward by means of the forceps. This he accomplished by turning the handles, and at the same time he made traction effort, until the occiput rotated from the sacrum to the plane of the ischium, when these instruments were removed, and re-applied as in an original second position of the vertex, when, of course, the rotation forward and delivery were readily accomplished; the occiput having described a complete semicircle. The child was born alive, and respiration was speedily excited.

M. Stoltz mentions another case of an original fifth position, in which the occiput rotated to the sacrum, then to the right sacro-iliac foramen, and in succession over the plane and ramus of the ischium on the right side, to be finally delivered under the arch of the pubis, describing at least five-eighths of a circle.

If, therefore, fourth and fifth positions can very universally be safely changed into second and first positions, and if children can survive the severe treatment of the forceps, as in the case of M. Cazeaux, the practitioner certainly will be justified by milder measures, slowly and carefully employed, gradually to convert a complete occipito-posterior into an anterior position of the vertex—trusting that the body of the child will rotate sufficiently with the head, during the successive contractions of the uterus, as to prevent any injury to the spinal marrow.

If, unfortunately, the head, from any cause remains fixed *at the superior strait*, between the sacrum and the pubis, and cannot be changed by the means just recommended, the practitioner, if the child be alive, should not abandon the hope of a safe delivery. Flexion may be increased by pressing upon the os frontis, so as to direct it more and more upward, behind the pubis. Should this fail, the vectis may be readily applied over the occiput to accomplish the same object.

Should these means be inadequate, a judicious trial should be made with the forceps, so as to bring the head through the superior strait, if practicable, with safety to the tissues of the mother, and thus prevent the dread resort to the perforator. Let it be observed, however, that the forceps should not be applied until flexion has been perfected, so that the cervico-bregmatic diameter is coincident with the sacro-pubic of the superior strait.

If the views now presented of the mechanism of labor in vertex presentations, and if, as has been so well

maintained by Professor Nagelè, there is a natural disposition, in acknowledged cases of fourth and fifth positions, for the occiput to rotate forward, and if this important fact be truly explained, as the author has suggested, by the greater comparative length of the anterior lateral inclined planes as compared with the posterior, it follows that there is no practical advantage in considering *transverse positions* of the vertex as requiring specific consideration. They all are, for practical purposes, first or second positions; for in either case, whether the occiput be upon the left or right side, it will strike upon an anterior inclined plane, and thus rotate anteriorly, and never posteriorly; although some delay may exist more frequently than when the occiput is originally directed further forward. Of course all such cases are to be treated precisely as has been already detailed in cases of fourth or fifth positions, upon the principle of facilitating this natural disposition to rotate forward, by the fingers or by the vectis. In these cases, however, it has been strongly recommended to apply the *forceps, with one blade toward the pubis and the other toward the sacrum*; the concave edge of the forceps being toward the side of the pelvis where the occiput is located. It is possible that in some very rare instances this operation in transverse positions, in the cavity of the pelvis or at the inferior strait, may be justifiable; but certainly in all cases where rotation can possibly be effected, so as to give at least an oblique position to the head, by means of the hand or vectis, this ought to be accomplished before the introduction of the forceps. In these transverse positions, the forceps cannot readily be applied, inasmuch as owing to the curvature of the blades the handles must be pressed very much to one side, and at the same time far back in the direction of the axis of the superior strait. Neither is it easy to apply the blades over the sides of the child's head, especially as regards the pubic blade, which, in this case, will have to be introduced to the lateral side of the pelvis over the top of the head of the child, and then when the handle is depressed, the blade is made to revolve from the top to the sides of the child's head directly behind the pubis—a measure not easily accomplished, and always accompanied with much danger of injuring the urethra, bladder, and other tissues in front, against which the head is pressing firmly. This danger is so great, that the author thinks it a good rule never to apply the forceps over the sides of the child's head in the cases now under consideration.

The exceptions to this rule ought certainly to be very few, either at the superior or inferior strait of the pelvis. The vectis can be employed with perfect safety to both mother and child, and will prove almost univer-

sally quite adequate to produce partial if not complete rotation, so that the forceps may be safely employed. If, however, the head should be immovable, that is, "locked" transversely between the pubis and sacrum, the mode of applying the forceps will be detailed in considering deformities of the pelvis.

LARGE SIZE OF THE SHOULDERS.—After the delivery of the head, delay may again ensue from the large size of the shoulders. This becomes more important, as the placental functions, having now ceased, and the respiratory process, even if commenced, can be very imperfectly performed while the chest is compressed within the pelvis, the child will speedily perish. In the artificial delivery of the shoulders, therefore, the first object of the practitioner, after delivery of the head and its restitution, is to examine whether the umbilical cord be entwined around the neck of the child; if so, its folds ought to be loosened by a little traction effort on that portion which goes toward the placenta, with the combined object of removing all pressure from the trachea of the child, and also to prevent the interruption of the circulation in the cord from the compression of its vessels.

The next business of the practitioner is to facilitate the rotation of a shoulder to the pubis and another to the sacrum. In the first position, for example, where the right shoulder is toward the right anterior inclined plane of the pelvis, this rotation may be facilitated in two ways: the first, which is generally the easiest, is to pass the right index finger along the spine of the child, and then direct it over the left scapula, so as to push the left shoulder posteriorly toward the sacrum, causing thereby the rotation of the right shoulder toward the pubis. The second mode is to operate upon the right shoulder, by passing the index finger anteriorly over the right clavicle, and hooking it on the acromion process; pressure being made in this direction will determine the shoulder from the right ramus of the pubis to the symphysis.

This rotation can generally be easily accomplished; after which, if the bearing-down efforts of the mother be not sufficient, the practitioner will be justified in making traction effort through the medium of the neck of the child—always being very careful that the neck be not in any degree twisted, and that no compression be made on the trachea. If such traction effort be made, the practitioner should properly support the perineum and direct the body of the child toward the pubis, so as to increase its lateral flexion and facilitate the descent of the left shoulder along the posterior wall of the vagina. If this be not adequate, traction effort may be made by the introduction of the

finger into the left or sacral axilla, by which the left scapula may be drawn forward; thus facilitating its advance toward the vulva, and giving more space within the vagina for the thorax to descend.

We find that the above mode of assisting the delivery of the shoulders is not sanctioned by all good authorities; many recommend the pressing of the child backward and the liberation of the pubic shoulder first. A fundamental objection to this plan is that it is not in accord with nature's mode of delivery, which allows the pubic shoulder to be at rest, or nearly so, on the sub-pubic ligament, until the perineum yields sufficiently for the descent of the sacral shoulder; the lateral flexion of the child's body continually increasing. This mode ought, therefore, to be imitated. Another objection is the greater danger of lacerating the perineum, as by the practice recommended, the distension of this tissue will be increased. This danger is, in many instances, very great, especially as the prior delivery of a large head has often lacerated the fourchette, or even a portion of the vagina or perineum.

In some cases of difficulty, it may be advantageous to cause the right or pubic shoulder to recede from under the arch of the pubis to a position behind the symphysis, so as to allow the right side of the neck to come in contact with the arch of the pubis, thus gaining space for the delivery of the thorax and posterior shoulder; after the delivery of which, the body of the child can be pressed backward toward the perineum, so as to allow the right shoulder to descend from behind the pubis, and delivery will be easier.

In making traction effort upon the axilla of the child, care must be taken not to use undue force, for fear a dislocation of the head of the humerus be produced.

When the child is dead, there can be no objection to applying the large blunt hook on the sacral axilla, so as to make more powerful traction, by which the left shoulder and arm may be extracted.

These delays, however, at the inferior strait, are comparatively very rare, owing to the mobility of the shoulders, the compressibility of the thorax, and the distensibility of the perineum.

The manœuvre for the delivery of the shoulders in cases of the *second position* is precisely the same, excepting that rotation must be facilitated in an opposite direction from left to right, anteriorly, so as to bring the left shoulder to the pubis, and the right to the perineum.

In other positions the same principle of facilitating the rotation of one or other shoulder to the pubis, according to the natural mechanism of labor, before traction effort is made, should govern the practitioner. Let him also remember that after delivery of the head,

nothing can be expected from uterine contractions; but the delivery is to be accomplished simply by the bearing-down efforts of the mother, or, if these be insufficient, by means of artificial assistance.

The inexperienced practitioner may be occasionally surprised to find a still further delay when the *hips* become engaged. This is of course very unusual; and when met with, this delay may be easily overcome by traction on the body of the child, care being taken that such traction be made upward toward the pubis, while a proper support is given to the perineum.

Authors have regarded *deviated presentations of the vertex* as including all those cases where the vertex or posterior fontanel has departed from the central portions of the pelvis to a less or greater degree, so that other portions of the head may be recognized toward the centre of the pelvis, the body of the child maintaining its usual position in the cavity of the uterus, its axis corresponding to that of this body. It will be more useful, however, to arrange these under distinct names, according as one or other portions of the head remain persistent toward the centre of the pelvis—in other words, to speak of different presentations of the child's head. Therefore we will treat of

PRESENTATIONS OF THE ANTERIOR FONTANEL.

By this we understand that at the commencement of labor, flexion does not exist: the chin has so far departed from the breast that the head is at right angles to the spine; the forehead and face are then to one side and the occipital protuberance upon the opposite. Of course, under these circumstances, the apex of the head, as represented by the anterior angles of the parietal bone and the anterior fontanel, will now be found toward the centre of the pelvis, and therefore should be regarded as *the presenting part*, according to the definition given of the word "PRESENTATION."

The *causes* why the anterior instead of the posterior fontanel should be at the centre of the pelvis, are not very evident; authors generally refer them to obliquities of the uterus. Thus, for example, if there be a great right lateral obliquity of the uterus, and especially if the liquor amnii be not abundant, the child will necessarily partake of the same obliquity. Hence, the vertex will be carried to the left side, and the top of the head may approximate the central portions of the pelvis. So also if there be a left lateral obliquity of the uterus and child, the vertex will be carried far to the right, and the top of the head may approximate the centre of the pelvis.

These obliquities may have some influence; but the more probable suggestion as to the cause of these devi-

ations is the *spontaneous motion of the child's head*, which is manifested not only during gestation, but at the commencement of labor before the membranes are ruptured. Perhaps every practitioner, on examinations during the first stage of labor, has noticed an alteration of presentation, and also of position; if, therefore, the membranes should suddenly give way, when the top of the head is opposite the os uteri, the contractions of the uterus which immediately follow may fix the head in this presentation.

Baudelocque attributes such deviations to a wrong direction of the expulsive efforts of the uterus, and Levret to the arrest of the shoulders at the superior strait. It is difficult, however, to conceive, unless there be great deformity of the body of the child, how such an arrest could possibly occur where the head has previously passed; and even if it did exist, how it could produce an anterior fontanel presentation; and yet we find some modern authors adhering to this notion, and making it the foundation for practical directions, which are very difficult, painful, and almost impracticable in their execution, and some of which they themselves declare to be irrational.

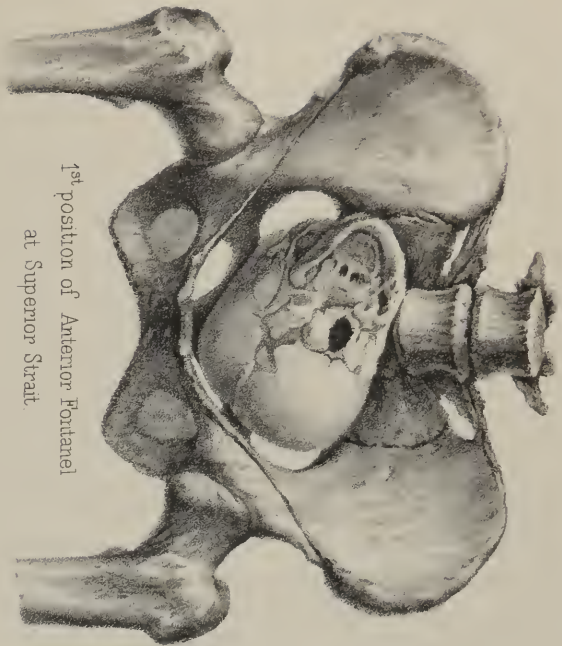
Whatever may be the cause, there can be no doubt that owing to this deficiency of flexion such presentations often occur at the commencement of labor; and although they may spontaneously disappear, they occasionally remain persistent, always being productive of delay, severe pain, and not unfrequently are dangerous to the child, and even to the mother.

Nægelè and most of his followers have, of late years, denied this assertion, stating that the head passes as easily in such deviated positions as in normal cases of vertex presentation. Its truth, however, is maintained by Baudelocque and Dewees, and is in perfect conformity, we think, with the experience even of those who theoretically maintain that this change is a matter of minor importance. This will appear in the sequel.

The mechanism of labor, therefore, should be carefully studied, especially as a little scientific assistance will almost universally afford speedy and complete relief.

LEFT OCCIPITO-ANTERIOR POSITION.—The study of these deviated positions of the vertex will be simplified by assuming the same number of positions as in vertex presentations; thus, as in the first position of the vertex, when flexion is complete the base of the occiput is toward the left acetabulum, and the anterior fontanel is toward the right sacro-iliac symphysis; so in the *first* position—that is, the left occipito-anterior position—of the anterior fontanel presentation, the occipital protuberance will be at the left acetabulum, and

Fig 109



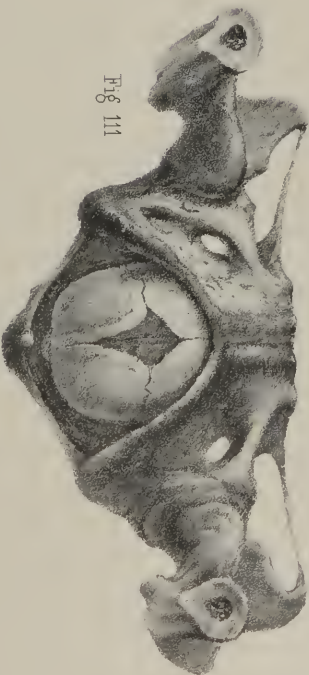
1st position of Anterior Fontanel
at Superior Strait

Fig 110



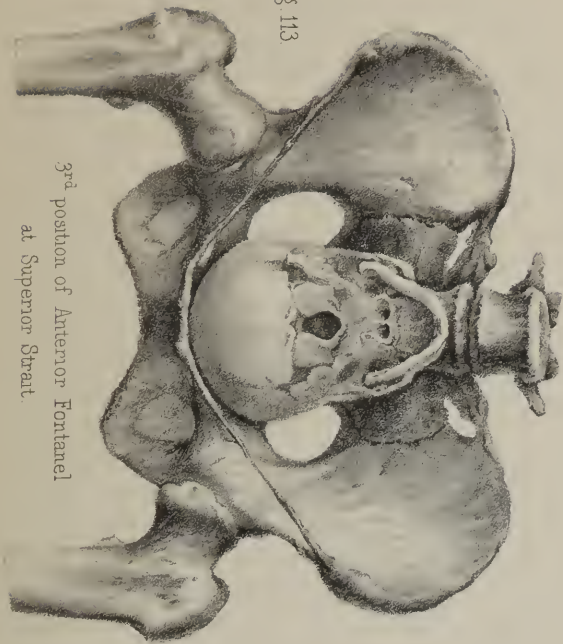
in Cavity of Pelvis

Fig 111



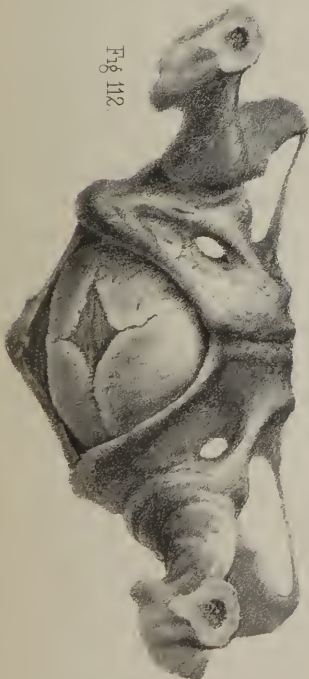
near Inferior Strait

Fig 113



3rd position of Anterior Fontanel
at Superior Strait

Fig 112



Head transverse in Pelvis

the forehead at the right sacro-iliac symphysis. (Plate XXI., Fig. 109.) Hence, the occipito-frontal diameter will now correspond to the left oblique at the superior strait, as a substitute for the cervico-bregmatic in vertex presentations. This is a mechanical necessity. The right parietal protuberance being at the right acetabulum, and the left at the left sacro-iliac symphysis, the bi-parietal diameter, as in vertex presentations, corresponds with the right oblique. Hence, it results that in this presentation the occipito-frontal circumference and plane of the head (Plate IV., Figs. 28 and 29) coincide with those of the superior strait (Plate II., Fig. 8) and orifice of the uterus, as a substitute for the cervico-bregmatic circumference and plane which are interested in vertex presentations.

The top of the head or anterior fontanel is now opposed to the bottom or coccygeal region of the pelvis, and the base of the head will look toward the fundus uteri. Hence, it follows that the perpendicular diameter of the head, from the base to the top of the head, corresponds to the axis of the uterus, and that of the superior strait of the pelvis. But, as formerly mentioned, we cannot draw an exact perpendicular diameter of the head, as the cervical vertebræ are attached to the central portion of the base; hence, the cervico-bregmatic diameter and the trachelo-bregmatic diameter, (Plate IV., Fig. 38,) both of which run obliquely from the base of the cranium to the apex of the head, are usually termed perpendicular and vertical diameters. We generally say, therefore, that the cervico-bregmatic diameter corresponds to the axis of the superior strait; but in other cases, where there is a slight flexion, the trachelo-bregmatic diameter may be said to correspond to the same axis.

From this statement it is at once evident that more delay will exist in this presentation of the sinciput, inasmuch that instead of the short diameter (the cervico-bregmatic) we have now the occipito-frontal, at least half an inch longer, presenting at the os uteri and the superior strait—hence, demanding a much greater dilatation of the os uteri for its passage, and thus the first period of this stage of labor becomes, necessarily, painful and tedious. If, however, the os uteri be very much relaxed or well dilated there will be no mechanical difficulty in the descent of the head through the superior strait, inasmuch as the left oblique is an inch longer than the occipito-frontal diameter of the head.

Nevertheless, at the os uteri it not unfrequently happens that a spontaneous conversion from an anterior to a posterior fontanel presentation occurs, which may be readily explained. The expulsive power of the uterus operating perpendicularly through the medium of

the spine on the child's head will have simply a tendency to push it directly downward toward the coccyx, but the descent will be resisted by the edges of the os uteri acting upon the superior part of the occiput and that of the os frontis. The occipital region being very convex, will more readily overcome the resistance of the os uteri than the broad and less convex surface of the os frontis. This last portion, therefore, will descend with greater difficulty than the occiput. If this difficulty should continue, owing to the rigidity of the os uteri, the forehead is retained, while the occiput descends; in other words, flexion occurs, the anterior fontanel gradually disappears from the centre of the pelvis, and is succeeded by the anterior portion of the vertex, and eventually, it may be, by the posterior fontanel, according to the degree of flexion, when, of course, the conversion is complete, and we have again the short diameters of the head, as in original vertex presentations.

In such cases, therefore, after unusual delay and suffering during the first period of delivery, labor will be completed, as in favorable presentations of the vertex.

But if, after the head has escaped from the os uteri, the anterior fontanel be still found toward the centre of the pelvis, the head usually descends without much difficulty to the floor of the pelvis; the anterior fontanel being opposed to the coccygeal plane. Sometimes the head remains obstinately in this oblique position; (Plate XXI., Fig. 110, and Plate XXIII., Fig. 118;) but, very generally, rotation occurs—the occipital protuberance, acting upon the left anterior inclined plane, rotates toward the pubis, and assumes a position behind the ramus or body of the pubis, (Plate XXI., Fig. 111,) instead of passing under it, as in vertex presentations.

Here, therefore, the head is arrested; the long diameter of the cranium (the occipito-frontal) is now presenting to the oblique diameter, or perhaps to the antero-posterior diameter of the inferior strait; and, of course, the whole occipito-frontal circumference and plane of the head, measuring twelve inches, is parallel to those of the inferior strait, (Plate II., Fig. 9,) measuring also twelve inches in circumference. It is manifest, therefore, that the head will be here arrested, unless a favorable change is spontaneously or artificially accomplished. In very many instances, where the expulsive pains are powerful and long continued, women deliver themselves, in consequence of the resistance made to the descent of the forehead by the sacro-sciatic ligaments, os coccygis, and perineum posteriorly, while anteriorly there is, comparatively, much less resistance, owing to the readiness with which the occiput, from its convexity, and from the oblique direc-

tion of the bodies and rami of the pubes, descends from behind the pubis, and glides under its arch; thus converting a presentation of the anterior fontanel, at the inferior strait, into one of the vertex; flexion of the head occurring, in consequence of the retention of the os frontis posteriorly.

Where, however, the contractions of the uterus are feeble, from any cause, the head may be arrested with the occiput behind the pubis, endangering the life of the child, and the welfare of the mother, unless proper assistance be afforded.

M. Baudelocque, followed by Dr. Dewees and others, detailed cases where the rotation of the head in these anterior fontanel presentations does not occur in the manner just mentioned; and where the head, probably from its original position, at the superior strait, is found to be *transverse in the cavity of the pelvis*; the occipital protuberance, therefore, being on the left side, and the forehead on the right side of the pelvis. (Plate XXI., Fig. 112.) On examination, per vaginam, the anterior fontanel will be felt near the coccyx, while the right parietal protuberance will be felt toward the symphysis pubis, or even at the orifice of the vagina. The occipito-frontal diameter thus corresponds to the transverse diameter of the pelvis, and the bi-parietal to its antero-posterior diameter. The contractions of the uterus, even when powerful, will be ineffectual in such cases to accomplish delivery. If the head be rather small and compressible, it may descend so as to become partially engaged in the inferior strait, where it will be arrested, there being no tendency to rotation, the occiput and forehead being upon the same level, and each acting upon an anterior inclined plane of the pelvis. To the inexperienced and unscientific practitioner, such cases are very deceptive; the parietal protuberance being felt at the vulva, the perineum, it may be, being much distended, and the bearing-down efforts powerful, give the idea that delivery must soon be accomplished. But this idea is delusive; spontaneously or artificially, a change must be effected in the head, by which flexion and rotation may ensue, that the occiput may descend, and eventually get under the arch of the pubis. Very universally, nature is inadequate to this conversion into a vertex presentation; the safety of the child and parent therefore depend on scientific assistance.

RIGHT OCCIPITO-ANTERIOR POSITION.—This is, of course, a deviation from the *second* position of the vertex; the chin, having departed too much from the breast of the child, brings the head at right angles to the spine, so as to pass obliquely across the superior strait of the pelvis. The occipital protuberance will,

therefore, be at the right acetabulum, and the forehead at the left sacro-iliac symphysis; the left parietal protuberance will be at the left acetabulum, and the right at the right sacro-iliac symphysis; while the top of the head, or anterior fontanel, will be found toward the centre of the pelvis. Hence, the occipito-frontal diameter will now correspond to the right oblique, and the bi-parietal to the left oblique, while the cervico-bregmatic or trachelo-bregmatic corresponds to the axis of the superior strait.

The mechanism of labor, in this case, must be precisely similar to that described in the first position, as the same diameters of the head correspond to the oblique diameters of the superior strait; the only difference to be remembered is, that, as the head is now in an oblique direction from the right acetabulum to the left symphysis, instead of being, as in the first position, oblique from the left acetabulum to the right symphysis, rotation must occur in an opposite direction, so as to bring the occiput, in this case, from the right toward the left, to get behind the ramus or body of the pubis.

Also, in those cases where the head assumes a *transverse position in the cavity of the pelvis*, the occipital protuberance will now be on the right side, and the forehead on the left; while the left parietal protuberance will be anterior toward the pubis and vulva, and the right, posterior toward the sacrum. With these minor exceptions, the two positions present no points of difference.

OCCIPITO-PUBIC POSITION.—This is a deviation from the *third* of the vertex. The occipital protuberance is now against or above the pubis, while the forehead is at the promontory of the sacrum; the right parietal protuberance being toward the right ilium, and the left toward the left ilium. (Plate XXI., Fig. 113.) The peculiarity of this *third* position of the sinciput—fortunately of very rare occurrence—is, that the occipito-frontal diameter now corresponds to the short or conjugate diameter of the superior strait, through which it, therefore, cannot pass. If there be no alteration in the presentation or the position of the head, it will become arrested at the superior aperture of the pelvis, instead of at the inferior, as occurs in the first and second positions. If, therefore, unfortunately, the head should remain persistent in this third position, it will be forced down firmly against the pubis and the promontory of the sacrum, and will not only be arrested, but, in technical language, “locked;” that is, it will become immovable, incapable of being depressed or elevated, and will, therefore, be soon followed by the arrest of the circulation, and, of course,

mortification in the tissues of the mother anteriorly or posteriorly; hence arise, especially, injury to the bladder and urethra, followed, if the patient survive, by vesico-vaginal openings.

Fortunately, however, such results are rare, inasmuch as, in analogous third positions of the vertex, there is a strong disposition to conversion into the first or second position: the convexity of the forehead, acting upon that of the lumbar vertebræ and sacrum, usually determine the rotation of the forehead to the right or left of the spine, so that this third position of the anterior fontanel is converted into a first or second position, with the usual results.

RIGHT OCCIPITO-POSTERIOR POSITION.—This, of course, is the reverse of the first, and a deviation from the *fourth*, of the vertex,—the occipital protuberance now being toward the right sacro-iliac symphysis, and the forehead toward the left acetabulum, the left parietal protuberance being toward the right acetabulum, and the right toward the left sacro-iliac symphysis, while the anterior fontanel will be toward the coccygeal region of the pelvis. (Plate XXII., Fig. 114.) Hence, we have, in this case, the same diameters of the head, applying to the same diameters of the “brim,” as in the first position; the only difference being, that the occipital extremity of the long diameter of the cranium is now posterior and to the right, instead of being anterior and to the left, as in the first position.

The expulsive efforts, depressing the head in the direction of the axis of the superior strait against the edges of the os uteri, may, as in the other positions, cause a spontaneous conversion into a vertex presentation; the os frontis being retained by the edges of the orifice of the uterus, while the convex occipital extremity more readily descends posteriorly.

But, in many cases, no such conversion occurs; the first period of delivery passes, after much delay and suffering, and the head descends to the floor of the pelvis; the occipital protuberance being toward the right posterior inclined plane, and the forehead and face toward the left anterior inclined plane. (Plate XXII., Fig. 115.) If the expulsive effort continues, rotation may occur, so that the occiput is thrown toward the sacrum, and the forehead and face behind the symphysis pubis. (Plate XXII., Fig. 116, and Plate XXIII., Fig. 120.) The anterior fontanel will be detected resting upon the rectum, while the bi-frontal suture may be traced up behind the symphysis pubis, and the practitioner can often recognize the orbits of the eyes behind the pubis, while the ears of the child and the parietal protuberances will be found on

the sides of the pelvis. Very universally, there will now be a complete arrest of the progress of labor; and the occiput, being retained by the os coccygis behind, and the breadth of the forehead and face, is so closely pressed against the pubis, as seldom to permit any favorable change, the occipito-frontal diameter attempting, as it were, but unsuccessfully, to enter the inferior strait. Still, however, in some few cases, where the head is not large and the mother is strong, her continued and powerful efforts may effect a conversion of the presentation at the outlet of the pelvis. In some instances, the forehead may glide upward behind the pubis, and thus allow the occiput to descend over the coccyx and the posterior perineum, to the vulva, thus converting this presentation of the top of the head into that of the vertex. As this process advances slowly and painfully, the anterior fontanel will be perceived gradually passing from the centre of the strait along the posterior wall of the vagina to the vulva, and, finally, to its position under the symphysis pubis, so that now the cervico-bregmatic diameter corresponds to the antero-posterior diameter at the outlet of the pelvis, as in original occipito-posterior positions of the vertex.

It thus results, that the forehead, being retained by the bones of the pubis, the occiput descends, followed by the neck and thorax of the child, so that the chin approximates the sternum, and flexion is advantageously produced.

In other instances, the occiput is retained at the lower part of the sacrum. Then, the contractions of the uterus may cause the forehead and face gradually to descend from behind the pubis. In such cases, the anterior fontanel recedes from the centre of the perineum backward to the coccyx, while the forehead, nose, and chin successively appear at the orifice of the vagina and under the symphysis pubis: in other words, we have the presentation of the anterior fontanel gradually converted into one of the face at the inferior strait of the pelvis, and the head can now readily pass through the inferior strait and os vaginæ, in the manner soon to be demonstrated in face presentations.

Generally, therefore, these fourth positions of the anterior fontanel presentations are cases of impracticable labor, the head being arrested either before or after rotation, with the face toward the ramus or body of the pubis; but in some few instances, a favorable change may be accomplished by flexion, permitting the descent of the occiput, or extension permitting the descent of the face to the pubis.

Perhaps, in some instances of this occipito-posterior position, the occiput may rotate toward the right side of the pelvis, and the forehead to the left, having the

left parietal protuberance to the vulva, as has been detailed in speaking of the second position.

Let it be remarked, that this fourth position of the anterior fontanel, where rotation has occurred, so as to throw the face behind the body of the pubis, should not be confounded with the fourth position of a vertex presentation, in which, at the inferior strait, the superior part of the os frontis, and not the forehead, gets behind the symphysis pubis. The distinction may be readily made by noticing that, in the vertex presentation, the occiput is low down toward the coccyx, and the anterior fontanel near the arch of the pubis; while, in presentations of the anterior fontanel, this opening of the head may be found at the centre of the inferior strait, and can be readily detected lying upon the anterior surface of the rectum, and the front part of the os frontis, close to the arch of the pubis. (Plate IX., Fig. 55, and Plate XXII., Fig. 116.)

Neither should these presentations of the sinciput be mistaken for forehead presentations, with which they have been confounded, especially by those individuals who do not bear in mind that the coccygeal region is at the bottom of the pelvis, and that the arch of the pubis is at the *anterior* portion of the pelvis; or by those accoucheurs who regard, as the presenting part, that portion of the foetus felt at the orifice of the vagina before the end of labor, instead of that part felt toward the centre of the pelvis. Hence, when on examination at the orifice of the vagina, the forehead is there felt, it should not be regarded as the presenting part, as it is then toward the anterior part of the inferior strait, while the anterior fontanel will be found lower down on the posterior perineum, near the anus, and, of course, constitutes the proper presenting part, that which, according to the definition, is toward the centre of the inferior strait.

LEFT OCCIPITO-POSTERIOR POSITION.—This is a deviation, of course, from the *fifth* position of the vertex; hence, instead of the base of the occiput, we have the occipital protuberance toward the left sacro-iliac symphysis, and the forehead toward the right acetabulum; the top of the head, or anterior fontanel, will now be the lowest part of the head in the pelvis, and opposite to the coccyx; hence, the occipito-frontal diameter now corresponds to the right oblique, and the bi-parietal to the left oblique, while the cervico-bregmatic corresponds to the axis of the superior strait.

The mechanism of labor, in this case, is precisely similar, therefore, as regards its progress and consequences, as in the fourth position; excepting, of course, that the rotation will now be accomplished in an opposite direction—the occiput rotating from the left toward

the right posteriorly, and the forehead from the right toward the left anteriorly; so that the forehead and face will be again brought behind the symphysis pubis. Care must be taken not to confound this with the fifth position of the vertex.

OCCIPITO-SACRAL POSITION.—This, of course, is seldom met with; for the occipital protuberance, being applied to the lumbar vertebrae and promontory of the sacrum, and being very convex, is almost universally turned to the right or to the left, thus altering it into the fourth or fifth. Should it, however, happen that this *sixth* position, with the forehead toward the pubis, the occiput toward the sacrum, and the anterior fontanel toward the centre of the pelvis, remains persistent, it will become a case of impracticable labor; (Plate XXII., Fig. 117;) inasmuch as the long diameter of the cranium is engaged with the short diameter of the superior strait, the head, therefore, cannot descend, but becomes “locked,” with imminent danger to the tissues of the mother and the life of the child.

Diagnosis of Anterior Fontanel Presentation.—To the experienced practitioner this will not be very difficult; nevertheless, as this presentation has received so little attention, of late years, since the doctrines of the German school have been paramount in the profession, it will be useful to fix attention upon the fact that the anterior fontanel will be detected toward the centre of the pelvis. Hence, when the head is high up or low down in the cavity of the pelvis, this fontanel will be found opposed to the coccygeal plane; but when the head has approximated the inferior strait, the fontanel will be found toward its centre, and, therefore, resting upon the rectum and perineum.

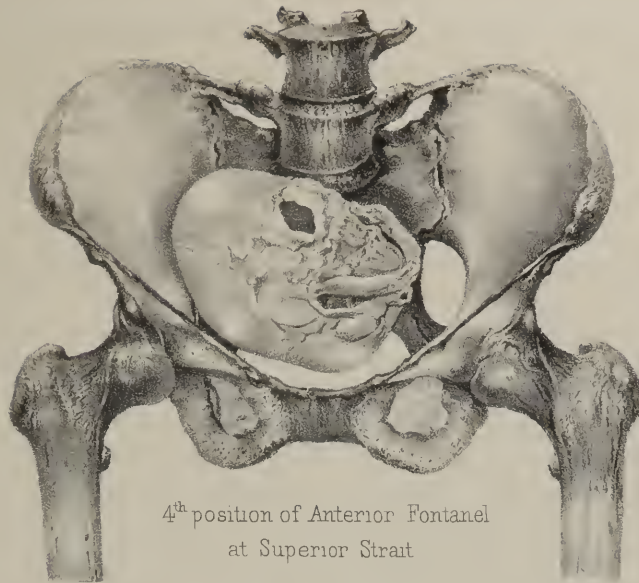
Careful observation will also show that the apex of the head—that is, the anterior extremity of the bi-parietal suture—will be the lowest point of the head, below the level of the os frontis, and also of the os occipitis.

The *positions* of this presentation of the anterior fontanel may be determined,

First. By recognizing the narrow acute angle of this opening formed by the two portions of the os frontis, and hence indicating the direction of the forehead and face.

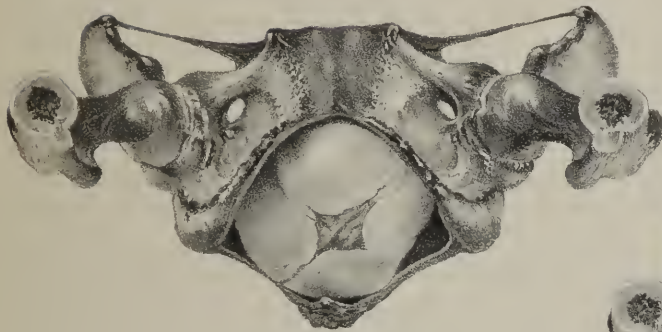
Second. By tracing the bi-parietal suture to the posterior fontanel and the occipito-parietal suture; or by following the bi-frontal suture to the nose, on either side of which the edges of the orbit will frequently be felt.

Third. In many instances the ear can be reached, and the position of its helix can be determined, indicating the location of the occipital region of the head.



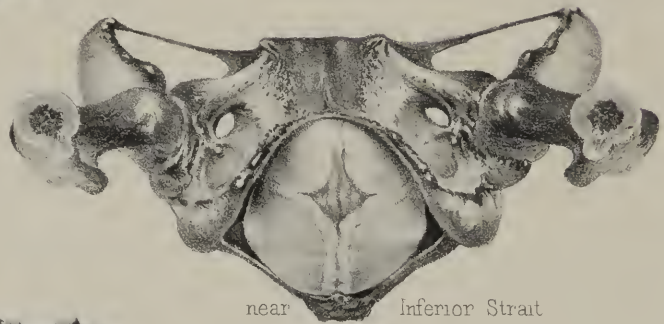
4th position of Anterior Fontanel
at Superior Strait

Fig. 115



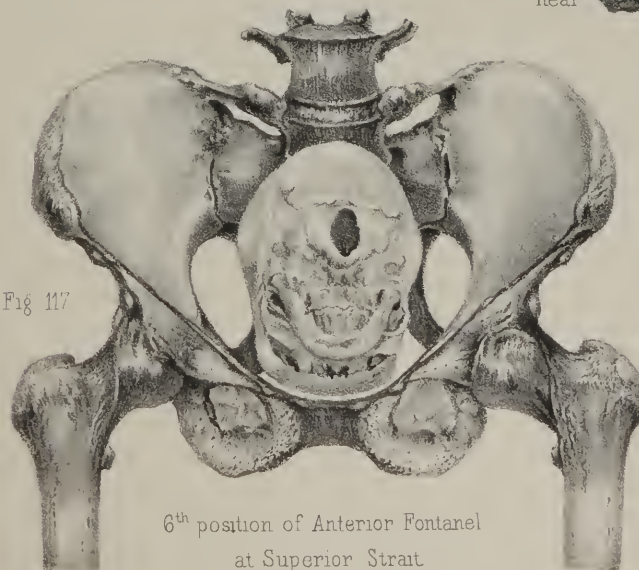
in Cavity of Pelvis

Fig. 116



near Inferior Strait

Fig. 117



6th position of Anterior Fontanel
at Superior Strait



Prognosis of Anterior Fontanel Presentation.—The prognosis in this presentation is usually regarded as very favorable. Nægelè asserts that the head will pass as easily as in the regular presentation of the vertex. There can be no question that, in a large majority of cases, this presentation is transitory; the resistance made by a partially dilated os uteri to the descent of the forehead facilitates the descent of the occiput, and, of course, the conversion into a presentation of the posterior fontanel.

There can be no doubt, however, that this is not always the case, especially where the os uteri is much relaxed; the bearing-down efforts, acting through the medium of the spine, and, therefore, at right angles to the head, however powerfully they may hasten descent, will have no tendency to effect any change of the relative position of the occiput or forehead; the occipito-frontal diameter remaining parallel to the diameters of the pelvis. In this way the head often descends to the inferior strait, where it will be arrested, unless flexion occurs, owing to the forehead being retained, while the occiput meets with less resistance to the progress of descent, as has already been explained.

The experience of the author is decided that in all such cases of persistent presentation of the anterior fontanel, *cæteris paribus*, the descent of the head is comparatively slow, painful, and often dangerous to the tissues of the mother, and even to the life of the child, demanding powerful and continued bearing-down efforts. This assertion is confirmed by the simple fact, that the occipito-frontal diameter, now involved, is at least half an inch longer than the cervicobregmatic, which is concerned in vertex presentations. It is also confirmed by the experience of almost every accoucheur, even of those who theoretically deny its importance, inasmuch as they detail cases of difficulty, sometimes of "arrest," or of the head being "locked," in such presentations, demanding, even for the safety of the mother, manual or instrumental assistance.

Presentations, therefore, of the sinciput or the top of the head ought not to be passed over under the general expression of "cranial presentations," as they may be persistent, and are then productive of serious danger to the child and its parent, and in all cases render labor tedious and painful in proportion to their duration, even should they disappear spontaneously.

Treatment of Anterior Fontanel Presentation.—This is very simple, and also very effectual, when the nature of the case is understood.

In the *first position*, therefore, the important indication is to facilitate flexion, so that the anterior fontanel may recede from the centre of the pelvis, and be replaced by the vertex or posterior fontanel; a con-

version being thus made from a presentation of the sinciput to that of the occiput.

The mode of accomplishing this change has already been intimated in speaking of retarded flexion in vertex presentations. Any right obliquity of the uterus which might possibly remain after the membranes are ruptured should be rectified according to directions hereafter to be given in speaking of labor complicated with obliquities. This rectification of the uterus may, in a few instances, be all that is required to correct the presentation. But usually flexion is to be facilitated by means of the finger or the lever. The index finger, in such cases, being applied on the right portion of the os frontis, the forehead is to be pushed directly upward, during the absence of the pain, and retained there when the bearing-down effort comes on. This, of course, by fixing the forehead and face, facilitates the descent of the occiput upon the opposite side of the pelvis. This pressure may often be made even before the os uteri is fully dilated, provided the diagnosis be clearly established; when, however, the head has descended through the os uteri into the pelvis, this pressure should certainly be made and be persevered in during every contraction of the uterus, until the object be fully accomplished. Should the finger not be adequate for the purpose, a lever ought to be applied to the sacral side of the occiput, (Plate XXIII., Fig. 118,) so as to cause its descent, and thus facilitate the ascent of the forehead. The conversion being completed, the labor will proceed as in original vertex presentations.

Should, however, the practitioner not be called until rotation has occurred so as to bring the occiput behind the ramus or body of the pubis, it will be more difficult to fulfil this important indication of promoting flexion. The attempt may be made to push up the os frontis, but owing to its distance from the vulva this attempt cannot be very influential; more may be accomplished by hooking the finger over the base of the occiput, so as to cause its depression. The vectis, however, is far more efficient, and can here be used very successfully and without pain to the mother, care being taken to avoid any pressure or other injury to the urethra or bladder.

In those cases where the head has descended *transversely*, so that the forehead is to the right and the occiput to the left side of the pelvis, two indications are to be fulfilled: namely, flexion and rotation are both to be accomplished. They, however, can be effected sometimes by the finger, or by the assistance of the lever. The index finger, for example, where the forehead is to the right side of the pelvis, can be carried to the upper and outer portion of the frontal bone,

so that pressure may be made upward, and thus produce flexion, and the forehead can be pushed backward and thus facilitate rotation. If any difficulty exists, the lever passed upon the left or sacral side of the occiput can, at the same time, produce flexion and rotation.

When the case has been long neglected, the occipito-frontal diameter corresponds to the bis-ischiatic of the inferior strait, owing to the powerful contractions of the uterus forcing the head as low as possible, so as to distend even the perineum and the vulva. Rectification of the presentation can very generally be accomplished by means of the lever passed underneath the vertex to the left side and base of the occiput, by which, assisted by pressure of the index finger on the right or pubic side of the os frontis, the rotation and flexion can be generally accomplished. If any great difficulty should ensue, the advice of Dewees should be followed, by pushing the whole head upward, during the absence of a pain, so as to disengage it from the inferior strait, and gain space for the occiput to descend and rotate from under the left ramus of the ischium.

Dewees seems to be of the opinion that this can very generally be accomplished simply by the hand; but there can be no objections to the use of the lever, which is far more efficient, excites no pain and no undue pressure upon the tissues of the mother; while by the hand space would be occupied, and the tissues irritated, when they are already so much distended by the impaction of the head at the outlet of the body.

Moreover, as Dr. Dewees also observes, this is no case for the forceps; this instrument ought not, certainly, to be applied in any case where the anterior fontanel presents at any portion of the pelvis, although such practice has been and still is recommended by high authority. It is evident, in such cases, that the blades of the forceps, which must pass in the direction of the axis of the pelvis, would embrace the head parallel to the cervico-bregmatic diameter, which now corresponds to the axis of the pelvis. Any traction, therefore, made by the forceps would have little tendency to alter the presentation, but would merely draw down the head with the occipito-frontal diameter still presenting; although it is possible that when much force is thus applied, the head may be drawn down to the vulva, and then, owing to the resistance to the forehead and face by the coccyx and perineum, the head may revolve so much in the grasp of the forceps as to allow the occiput to get under the arch of the pubis. Such a change can only be accomplished at the risk of the tissues of the scalp, and also of the perineum, and even endangers

the life of the child, unless the head be unusually small, and the tissues of the mother greatly relaxed.

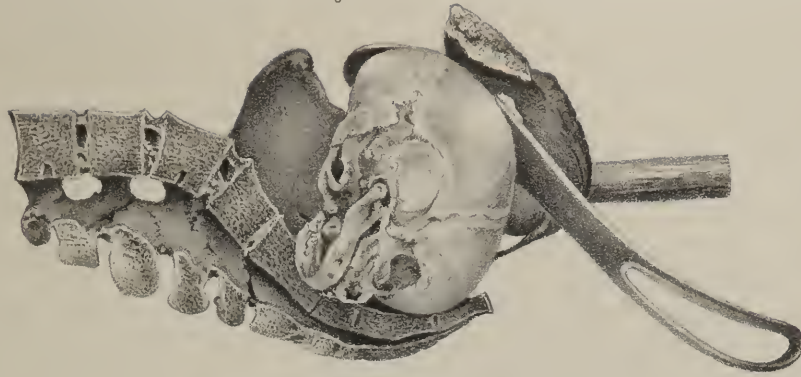
In the *second position* the same principle should guide us, and the same practice will be demanded, bearing in mind that the occipital protuberance is now at the right side of the pelvis, instead of the left, as in the first position; therefore rotation should occur, with or without the assistance of the practitioner, in an opposite direction. When the finger is employed, pressure should be made upon the left side of the os frontis, which is now the pubic side; or, if the vectis be used, it should be applied to the right or sacral side of the occiput, (Plate XXIII., Fig. 119,) so that flexion may be produced, and the occiput rotated from right toward the left anteriorly, to the arch of the pubis.

In the *third position*, should the practitioner meet with one of those rare instances in which the head becomes fixed between the pubis and the sacrum, so that the occipito-frontal diameter of the head corresponds to the sacro-pubic of the superior strait, positive interference is demanded; there should be no delay in this case, for the tissues of the mother are dangerously compressed by the head of the child, and the longer this pressure is continued the greater the liability to mortification and sloughing. If called early, the practitioner may make an attempt to produce flexion by pressing on the os frontis; but generally the whole hand had better be at once introduced into the pelvis, to embrace the head, so that the fingers of the right hand, for example, should be applied to the left temple, and the thumb to the posterior part of the right parietal bone. The whole head, during the absence of a pain, should then be pushed directly upward, in the axis of the superior strait, so as to disengage it; then the forehead can be carried to the right side of the lumbar vertebræ, and the occiput, of course, to the left of the pubis. The fingers can then be glided along the side of the child's head toward the base of the occiput, so as to cause its depression, thus producing flexion, and, at the same time, the conversion of this third position of the anterior fontanel into a first position of the vertex.

Occasionally it can be more readily converted into a second position; in which case, it will be more convenient to employ the left hand, carrying the fingers to the right temple and the thumb toward the left side of the occiput, and operating as in the former case, except that the forehead should be directed toward the left sacro-iliac symphysis.

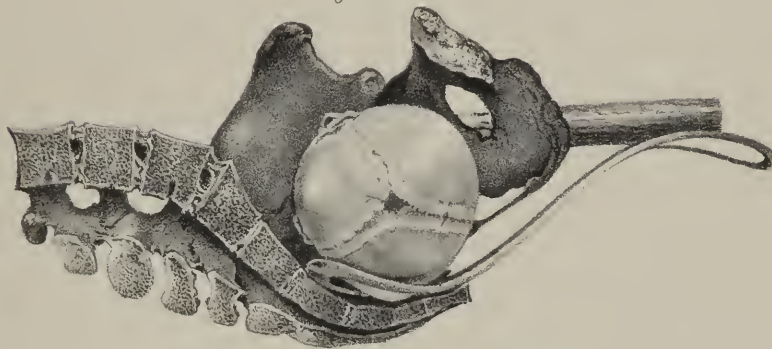
Should this manœuvre fail, a judicious attempt should be made with the vectis, passed over the base of the occiput near the pubis, taking special care not

Fig 118



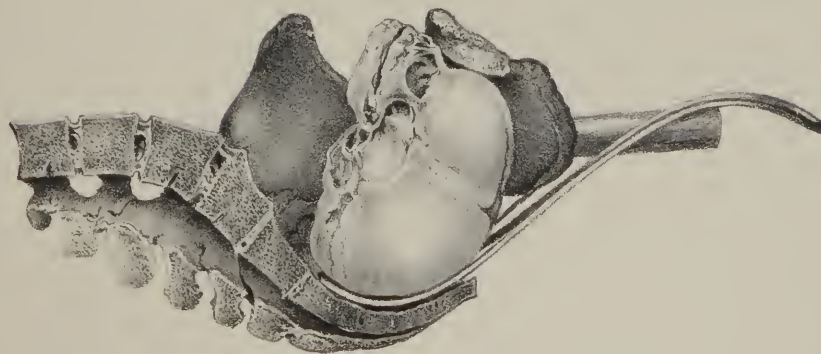
Oblique position of Anterior Fontanel
Vectis applied

Fig 119



Transverse position of Anterior Fontanel
Vectis applied

Fig 120



Posterior position of Anterior Fontanel
Vectis applied

to injure the bladder or urethra. By this instrument, assisted by the fingers directed against the os frontis, flexion may be induced, so as to secure a vertex presentation.

Should this also fail, it may be right, as has been recommended—provided the child be still living—to apply the forceps to the side of the head, so as to grasp the head firmly and push it directly upward, during the absence of a pain. If by these means the head should be fortunately disengaged, it should be changed to a first or second position by rotating the handles of the forceps. This change of position being accomplished, the forceps should be removed, inasmuch as the blades would correspond to the trachelo-bregmatic diameter, and traction effort made by them would cause the head to descend, presenting the anterior fontanel; and, of course, the occipito-frontal diameter would be concerned. The case should now be treated as recommended in original first or second positions of the sinciput.

We are surprised to find that M. Cazeaux, who acknowledges the third and also the sixth position may occasionally be met with, should declare that, if the head be fixed with its occipito-frontal diameter between the pubis and the sacrum, the only resource of the practitioner is the forceps, not for the purpose of altering the position of the head, but to draw it down in this state of mal-presentation and mal-position, certainly with the greatest possible risk to the tissues of the mother and the safety of the child.

Should, however, the child be dead, or the head be completely “locked,” with its occipito-frontal diameter engaged between the pubis and the sacrum, there is nothing left for the practitioner but the operation of craniotomy, to preserve the tissues and the life of the mother.

In the *fourth position* of an anterior fontanel presentation, it becomes still more important not to trust simply to nature’s efforts, but to facilitate flexion and rotation so as to prevent subsequent delay and mischief. The finger, therefore, should be carried at once to the left or pubic side of the os frontis, so as to elevate it as much as possible, that the chin may approximate the breast. This can be done more effectually in this case, as we not only operate on the anterior portion of the head, the long arm of the lever, but toward the anterior part of the pelvis, where that pressure can be more readily made than when the forehead is posterior. While making flexion, the practitioner should also direct the forehead backward toward the sacrum, so as not only to facilitate the conversion into a vertex presentation, but also the rotation of the occiput forward toward the arch of the pubis.

This manœuvre failing, the vectis applied to the right or sacral side of the occiput, far back toward the right and posterior portion of the pelvis, will be very efficient in causing flexion and also rotation anteriorly.

If, however, the practitioner should not be called until rotation has occurred, and the forehead and face be thrown behind the pubis, two modes of delivery may be attempted; the choice being left to the discretion of the practitioner under the peculiar circumstances of the case. The first mode consists in pressing the forehead up more and more behind the pubis, while, if necessary, the occiput may be drawn down, either by a fillet or by the lever, (Plate XXIII., Fig. 120,) and thus *flexion* be induced; delivery will then be accomplished as in original occipito-posterior positions of the vertex, where the occiput is in the hollow of the sacrum.

Dr. Meigs details a very interesting case of this kind, where the face was behind the pubis, the root of the nose and the orbits of the eyes being perceived toward the lower margin of the pubis. The Dr. failed in his efforts to rotate the forehead to the left side, and also to push the os frontis upward behind the pubis. He then resorted to one blade of Davis’ forceps, and caused the head slightly to descend. This failing, he applied Baudelocque’s forceps, and succeeded in distending the perineum. Being afraid of rupture, the forceps were removed, and the vectis applied, causing further descent of the occiput. This instrument was also removed, and a strong pain pushed the occiput over the perineum and fourchette, and the head was delivered as in an original occipito-posterior position of the vertex.

The other mode is to convert this presentation of the anterior fontanel at the lower part of the pelvis into a *face presentation*; in other words, instead of favoring flexion in the manner just recommended, *extension* may be produced, so as to make the chin descend from behind the pubis till it passes under the arch. This may be attempted by directing the finger deeply into the vagina, and pushing up the occiput; but more effectually by passing the finger upon the right side of the face, and hooking it over the lower jaw, so as to draw down the chin under the symphysis pubis, when delivery may be accomplished as in face presentation at the inferior strait. Should the head have long been arrested in this position, and there be positive indications of the death of the child, then the blunt hook might be passed instead of the finger over the jaw, so that more power can readily be exercised in bringing down the face.

There can be no doubt that in a large majority of cases, it would be better when the head is thus arrested,

to produce flexion rather than extension; because this is more in accordance with the natural mode of delivery, although we shall have to contend with the disadvantages peculiar to occipito-posterior positions of the vertex. Moreover, if the head should be large, or even of the ordinary size, it would be difficult to effect a descent of the chin from behind the pubis, as in that case the whole occipito-mental diameter, measuring five inches, will have to revolve between the pubis and the sacrum, which usually measures but four inches and three-quarters. It may, however, be effected, in most instances, owing to the compressibility of the head in its long diameter, and to the mobility of the lower jaw, or if the child's head should be rather small in comparison with the size of the pelvis.

In the *fifth position* of the anterior fontanel presentation, the treatment is precisely the same as that in the fourth position, excepting that the practitioner must bear in mind that rotation should be made to occur in the opposite direction; that is, the os frontis should be pressed from the right acetabulum toward the sacrum, converting it into a first position of the vertex.

The treatment in the *sixth position* resembles that of the third, as in both the long diameter of the cranium corresponds to the short diameter of the superior strait; hence two indications are to be fulfilled, the one to convert this sixth into a fourth or fifth position, and the other to convert the anterior fontanel presentation into that of the vertex. These changes may be accomplished by the finger, the hand, the lever, or the forceps, according to the directions and limitations already detailed under the treatment of the third position.

Interference in all such cases should be determined on as soon as practicable, so as to prevent dangerous consequences to the mother and also to the child. Neglect, or even delay, may render craniotomy requisite, for the safety of the tissues or life of the mother.

We have already insisted upon the importance of considering the *presentation of the anterior fontanel or sinciput*, as fundamentally distinct from that of the *posterior fontanel or vertex*; and that there must be, theoretically and practically, *ceteris paribus*, much more difficulty in the delivery—theoretically, as the occipito-frontal diameter measures at least half an inch more than the cervico-bregmatic; and practically, as innumerable cases are upon record of death of the child, and severe injury to the mother, resulting entirely from this mal-presentation.

That in a large number of cases it is spontaneously changed into a vertex presentation, there can be no doubt, as has been so emphatically insisted upon by the Heidelberg professor, M. Nægelè. If this change

occur at the os uteri, the delay is not very protracted; but if it does not ensue until the head reaches the inferior strait, the conversion demands strong and reiterated pain, involving great suffering and anxiety to the mother, and a prolongation of the labor.

Where, however, a change does not ensue, the tissues of the mother are often irreparably injured and the life of the child is sacrificed. The author was called to a case in consultation, where the head presenting, the sinciput was arrested, in the left occipito-posterior position, in a small pelvis. The practitioner, ignorant of the cause of delay, exhibited large doses of ergot without advancing the head below the brim of the pelvis. Instrumental delivery became necessary: the child died, the mother suffered from retention of urine, and inflammation, followed by a vesico-vaginal fistula. M. Chaillly describes a similar presentation, also in a contracted pelvis, where after severe labor, protracted for twenty-four hours, delivery was effected, without assistance, it is true, but the child was dead and the mother was tormented with a vesico-vaginal fistula. Nevertheless, M. Chaillly advises no interference, declaring that such cases usually rectify themselves without difficulty. M. Cazeaux also trusts these presentations to the natural efforts for at least six or eight hours, no matter how severe may be the sufferings and anxieties of the mother, or the dangers to the infant. At the expiration of the six or eight hours, assistance becomes requisite, he says, for fear the tissues of the mother may be injured—which assistance may be attempted by the hand for a short time, but very soon recourse must be had to the forceps.

Ramsbotham also advises that, when the forehead is to the groin and the occiput to the sacro-iliac symphysis, the case should be left to nature as long as possible; but if the head will not advance, then instruments become requisite: but as to what instruments, or in what manner applied, no directions are given.

Very many other authorities might be quoted, who advise trusting the correction of such presentations entirely to the natural efforts, avoiding all assistance until danger to the child or tissues of the mother are imminent. Why the advice of Baudelocque—to rectify all such presentations by the simple means already detailed, which give no pain to the mother, and can inflict no injury upon the child—is neglected, seems to the author altogether inexplicable; for these means are efficient, and it is certain also that although, in many cases, they may not be absolutely demanded, yet in all they diminish the sufferings of the parent, and the tediousness of the labor. In many instances, also, the presentation would otherwise be *persistent*, to the great detriment of the mother's tissues, with danger

to the life of the child, and, it may be, even of its mother.

All these difficulties and dangers can be always obviated, so far as the author's experience is concerned, by the measures already recommended.

Reference to books will also exhibit great inattention to the mechanism of labor in these cases, and hence they recommend very unscientific modes to effect delivery. The very simple, easy, and efficient measure advised by M. Baudelocque, and sanctioned by Dr. Dewees, have been generally neglected. The hand has been introduced to bring down the occiput, thus exciting severe pain, and augmenting the terror of the patient. This even, according to the experience of M. Cazeaux, has failed, and he expresses the preference, in some instances, in favor of podalic version, which has succeeded with him in two cases, where the hand and the forceps had failed. Cazeaux intimates that, in many of these cases, version by the feet might be preferred, especially if any liquor amnii still remained in the uterus. This operation is recommended by M. Levret, but repudiated by Baudelocque, and very generally by the best authorities. The author cannot conceive that podalic version can ever be justified in presentations of the anterior fontanel: for such version can only be safely accomplished where the head is still within the os uteri; and then it should not be recommended, as it is a matter of universal experience that such presentations are often spontaneously rectified, at the time the head passes the os uteri, and most will acknowledge that should they persist, a favorable change can readily be procured.

If the head, however, has escaped the os uteri, every attempt at version by the feet would be fraught with most dangerous consequences; and, very universally, it would be found impracticable.

Where manual assistance has failed, M. Baudelocque recommends the "lever," which we, from reiterated experience, have found to be easy, and most efficient in its operation, never inflicting any pain to the mother, or injury to the tissues of the child or its parent. Nevertheless, almost all recent authors recommend the forceps. These, however, cannot, in the presentation of the anterior fontanel, be applied parallel to the long diameters of the head of the child; for, in this presentation, it is the vertical diameter which is coincident with the axis of the pelvis, and the blades of the forceps would, therefore, be parallel to this vertical diameter. All traction effort, therefore, made with the forceps would have no direct tendency to alter the presentation; but it would cause the head to descend, still presenting the occipito-frontal diameter, which could not be dragged through the openings of the pelvis and

vagina, without great risk to the child and to the tissues of the parent, and, of course, with great increase of suffering. "It is no case for the forceps," says Dr. Dewees; the vectis or one blade of the forceps is all that is requisite; its application is easy, not painful, and very effectual.

Another objection to the forceps, applied perpendicularly to the head, has seldom been noticed, viz., that the extremities of the blades will project below the base of the cranium, and may, therefore, injure the neck, or even the shoulders of the child. In those cases, also, where the cord is entwined around the neck the circulation in the umbilical vessels may be obstructed by pressure from the blades, and thus asphyxia, or death of the infant, may be produced; or it is even possible that the vessels of the cord may be wounded, and the safety of the child may be endangered from hemorrhage. Such a case occurred to the author early in his professional career, where he used the forceps for an arrest of the head at the inferior strait—the forehead to the pubis and the occiput to the coccyx. The forceps were applied, and the head dragged forcibly through the inferior strait, the face emerging under the arch of the pubis. As soon as the head was liberated, a jet of blood issued from a wounded umbilical artery. No bad consequences resulted, as complete delivery was soon accomplished, and the child was strong and vigorous.

In some instances, where the child's head is large, or the delay has been greatly protracted, *the fetus may be dead*. If this be satisfactorily ascertained, the practitioner may feel at liberty, if delivery cannot be easily effected by the fingers or the vectis, to resort to craniotomy instruments; their use being based on his knowledge of the mechanism of labor. In one case—where the child's head was comparatively very large, and was arrested at the bottom of the pelvis, with the face against the pubis, and the anterior fontanel on the perineum, and where the practitioner in attendance requested the assistance of the author—a blunt hook was passed along the side of the face, and directed over the chin, so that this was forcibly depressed under the arch of the pubis, converting the presentation of the sinciput to that of the face; the mother speedily recovered without injury, although the labor had been long protracted.

PRESENTATIONS OF THE OS FRONTIS.

This is also another deviation from a vertex presentation. It has been stated that when the head is greatly flexed we have the posterior fontanel or vertex at the centre of the strait, and when the head is at

right angles to the body, we have the anterior fontanel at the centre; but when it is in a state of partial extension, it will be found that the point or apex of the forehead, or the central portion of the bi-frontal suture, is toward the centre of the pelvis, and we have, therefore, what may be termed the presentation of the forehead; or, what may be more correctly called, *presentation of the os frontis*. This, for reasons presently to be mentioned, should be distinguished, on the one hand, from face presentations, and, on the other, from those of the anterior fontanel, with both of which it is closely allied, and very usually confounded.

In this presentation, on examination, per vaginam, the practitioner will distinguish the apex of the forehead as the lowest portion of the head, and opposed to the coccygeal region. In the *first position*, we will trace the bi-frontal suture and the anterior fontanel toward the left anterior inclined plane of the pelvis; while, on the opposite and posterior side of the pelvis, we can detect the features of the face, especially the nose. It will be found, therefore, in this first position of the frontal presentation, that the chin of the child will be toward the right sacro-iliac symphysis, and the middle of the parietal bones toward the left acetabulum; while the right boss of the os frontis is toward the right acetabulum, and the left boss toward the left sacro-iliac symphysis. (Plate XXIV., Fig. 121.) It is manifest, therefore, that in this first position of the frontal presentation we have the parieto-mental diameter of the head corresponding to the left oblique of the superior strait; while the bi-temporal, in the first instance, and afterward, when the head descends, the bi-parietal, corresponding to the right oblique. (Plate IV., Figs. 33 and 34.) Moreover, the point of the forehead being the lowest part of the head, and the cervix or base of the occiput being above, we have the cervico-frontal diameter (Plate IV., Fig. 38) corresponding to the axis of the superior strait. We say, therefore, that the head descends perpendicularly, with the plane of the parieto-mental circumference, (Plate IV., Fig. 34,) parallel to that of the superior strait. (Plate II., Fig. 8.)

As the head is in this state of demi-extension, it is manifest that the contractions of the uterus, operating through the medium of the spine, will be directed toward the os frontis, and, therefore, there will be no disposition whatever to flexion. But, on the contrary, since the contractions act upon the anterior part of the head, there will be a strong tendency to increase the extension, especially as a very large portion of the cranium, being upon the left side, will be firmly resisted by the sides of the uterus and pelvis; while, toward the right, there is, comparatively, little resistance to

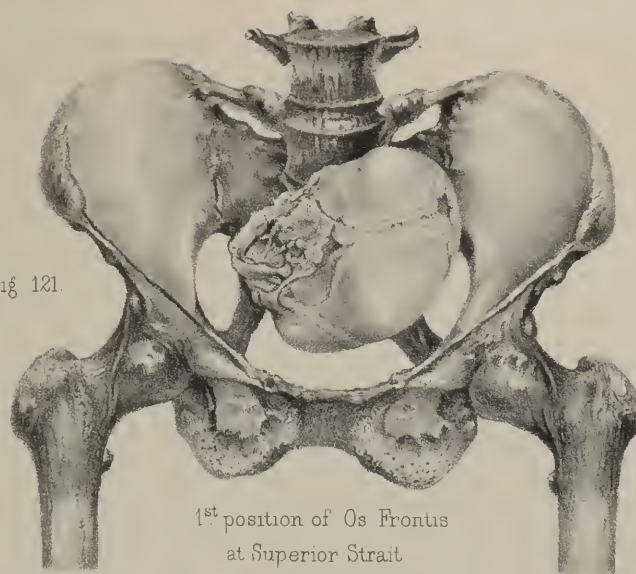
the descent of the chin. Thence the chin descending, the base of the occiput will be pressed nearer and nearer to the spine of the child, and the apex of the forehead, in such cases, will be found approximating nearer and nearer the side of the pelvis, till, eventually, when extension is complete, the root of the nose will be found toward the centre of the pelvis; in other words, there may be a spontaneous conversion of the presentation of the os frontis into that of the face. This, as recognized by all authors, occurs so frequently, that presentations of the os frontis have been described under the name of brow presentations, or deviated presentations of the face. Nevertheless, in some instances, whether from rigidity of the os uteri, or from other causes, this change does not occur. The head, after considerable delay at the os uteri, in consequence of the parieto-mental diameter, measuring four and a half inches, being concerned, may descend through the superior strait into the cavity of the pelvis to the coccygeal region, where the os frontis will be felt, and the anterior fontanel will be toward the foramen thyroideum. (Plate XXIV., Fig. 122.) The head will now be arrested, owing to the great length of the parieto-mental diameter.

Under the influence, however, of powerful contractions of the uterus, and the necessary resistance of the top of the head against the side of the pelvis, the spontaneous conversion may even yet be made into a face presentation; so that now the apex of the forehead will be felt toward the left ramus of the pubis, and the nose toward the coccygeal region. If, however, strong pains do not exist, it will become a case of impracticable labor without artificial assistance.

It is possible, especially if the head be small, that rotation may occur, so as to get the sagittal suture behind the pubis, the os frontis to the perineum, and the chin toward the hollow of the sacrum, where the arrest of the head will again occur. Such a case the author has not met with.

In the *second position* of a frontal presentation—a deviation from the second of the vertex—the mechanism does not differ from the former, or first position, excepting in the fact that the head is oblique, between the right acetabulum and the left sacro-iliac symphysis. Hence, in this case, the parieto-mental diameter corresponds to the right oblique, the bi-temporal or bi-parietal to the left oblique, and the cervico-frontal again corresponds to the axis of the superior strait. Of course this necessitates the left parietal boss to be opposed to the left acetabulum, and the right to the left sacro-iliac symphysis. The head, therefore, if not converted into a face presentation, will be arrested, either at the floor of the pelvis without rotation having

Fig. 121.



1st position of Os Frontis
at Superior Strait

Fig. 122.



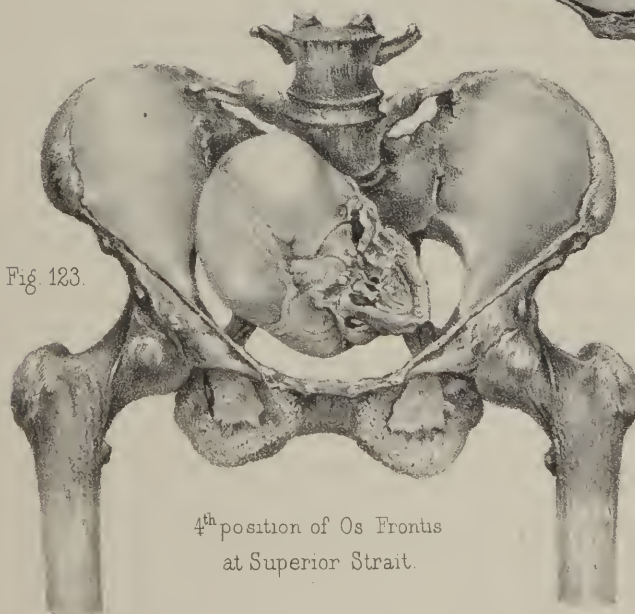
in Cavity of Pelvis

Fig. 124.



in Cavity of Pelvis.

Fig. 123.



4th position of Os Frontis
at Superior Strait.

occurred, or at the inferior strait after rotation has been effected, bringing the chin toward the hollow of the sacrum.

The *third position* of an os frontis presentation—a deviation from the third of the vertex—may be alluded to in this systematic arrangement, but in practice it can hardly exist, after expulsive contractions have commenced. The sharp point of the chin will almost inevitably be turned off from the promontory of the sacrum, so as to give an oblique position to the head; or else it will so readily glide under the promontory of the sacrum as to insure a speedy conversion into a face presentation.

The *fourth position* of a frontal presentation—a deviation from the fourth of the vertex—is, of course, the reverse of the first position. In this case, therefore, the chin will be toward the left acetabulum, the middle of the parietal bones toward the right sacro-iliac symphysis, the left parietal protuberance over the right acetabulum, and the right toward the left sacro-iliac symphysis, and the apex of the os frontis at the centre of the pelvis. (Plate XXIV., Fig. 123.) The mechanism of labor is similar to that detailed in the former cases; but the result may be more favorable to mother and child. Thus, if the conversion does not occur at the os uteri, into a face presentation, the chin will descend upon the left anterior inclined plane, till the os frontis reaches the bottom of the pelvis at the os coccygis, (Plate XXIV., Fig. 124,) where the head may be arrested, as in the former positions. Nevertheless, rotation may be effected, and, in these occipito-posterior positions, it occurs more frequently than when the occiput is anterior. This arises from the readiness with which the chin, after it passes the ramus of the pubis, may rise under the arch of the pubis, and thus allow flexion of the head to occur, the occiput sinking into the hollow of the sacrum, as the chin glides under the arch of the pubis. In other words, the conversion from a presentation of the os frontis into that of a face ensues at the inferior strait.

The *fifth position* of the os frontis presentation—a deviation from the fifth of the vertex—is, of course, the reverse of the second. The chin now being toward the right acetabulum, the sagittal suture at the left sacro-iliac symphysis, the right parietal protuberance toward the left acetabulum, and the left parietal protuberance toward the right sacro-iliac symphysis. Of course, therefore, the parieto-mental diameter will now correspond to the right oblique. The mechanism of labor will be the same as in the former cases, and the head may be arrested at the bottom of the pelvis in this oblique position, or the chin may rotate upon the right anterior inclined plane from right to left toward the

pubis, eventually presenting under the symphysis—giving rise, therefore, to a face presentation at the outlet of the body.

The *sixth position* of a frontal presentation—a deviation from the sixth of the vertex—must be exceedingly rare, as the convexity of the parietal bones against that of the lumbar vertebræ would generally insure a conversion into the fourth or fifth position; but still it may happen, owing to the breadth of the top of the head, or some peculiar form of the bodies of the pubes, that this sixth position may exist; but necessarily there will be a perfect arrest of the head at the superior strait, as the parieto-mental diameter is so much longer than the sacro-pubic. We may, however, in this sixth position generally anticipate conversion into a face presentation—the resistance of the lumbar vertebræ against the top of the head and the pressure of the chin against the bones of the pubis being very favorable to further extension of the head, and the consequent conversion into a face presentation.

Treatment of Presentations of the Os Frontis.—If the views now presented of the mechanism of labor in these presentations be correct, it follows that it is the imperative duty of the practitioner to ascertain the existence of such deviation as early as practicable, and to seize the proper moment to correct this malpresentation.

Although it is true that perhaps in a majority of cases there will be a spontaneous change into a face presentation, yet, in some instances, such change does not occur, as will be presently illustrated, and then the welfare of the child and that of the mother will become seriously involved. Moreover, even if conversion occurs into a face presentation, in any of the occipito-anterior positions, the dangers to the child and mother are but slightly diminished, inasmuch as these sacro-mental positions of the face, as will be presently seen, are very unfavorable and often dangerous. The best advice, we think, is to resort immediately to “version by the vertex,” that is to convert these frontal presentations into those of the vertex, as soon as the os uteri is sufficiently dilated for the passage of the hand of the practitioner. The mode of operating in such cases has already been detailed,—by the introduction of the right hand so as to pass the fingers over the occiput, causing it to descend in order to produce flexion of the head, and bring the vertex to the centre of the os uteri. Even if the whole head has passed the circle of the os uteri, the same operation may often be executed. Should it be found impossible or be deemed inadvisable to introduce the hand into the vagina, one or two other modes for relief may be adopted—one to induce flexion, and thus secure the advantage

of a vertex presentation; the other to cause extension, and thus convert into a face presentation.

Flexion may occasionally be readily produced by one or two fingers placed on the top of the os frontis so as to elevate it, and cause the chin to approximate the breast. This manœuvre will be occasionally facilitated by the application of a lever over the base of the occiput, so as to cause its depression. This, however, will generally be difficult, as the occiput is quite elevated, and it will be no easy matter to pass the lever to the sub-occipital region of the head; and care also must be taken not to lose valuable time in the attempt, as the bearing-down efforts will rapidly fix the head in this unnatural position.

In order to convert it into a face presentation, which is more in accordance with the mechanism of labor in this presentation, *extension* should be produced.

In the *first position*, this can be readily accomplished by one or two fingers carried to the vertex, pressing the occipital region of the head nearer to the spine of the child; then, of course, extension occurs, the os frontis approximates the anterior inclined plane, and the nose will be found toward the centre of the pelvis.

Let it not be forgotten, however, that whenever such pressure is made upon the parietal bone, a posterior inclination should be given to the occiput, so as to determine the chin forward, as in other favorable positions of the face.

Nevertheless, we will repeat, that the conversion into a vertex presentation has great and decided advantages over that into a facial presentation, as will presently appear.

The treatment of the *second position* must be precisely similar; except, that version by the vertex must be performed by the left hand, instead of the right, as the occiput will now be upon the right side of the pelvis.

If the *third position* be timely detected, version by the vertex should, of course, be immediately accomplished, either by the right or left hand of the practitioner; or, if this be not practicable, the natural disposition of the chin to turn off from the promontory of the sacrum should be facilitated by pressure with the finger upon the right or left side of the parietal bone. By fulfilling this indication, the head will be converted from a third position of a frontal presentation into a first or second, as the case may be, to be treated as already directed.

In the *fourth position* of the os frontis, it will be still the better practice to resort to version by the vertex, in order to gain all the advantages incident to occipital presentations. Nevertheless, in these cases, it is less important than in the occipito-anterior posi-

tions, inasmuch, as has already been shown, there is a stronger disposition to a spontaneous conversion into a face presentation.

The practitioner, therefore, if he arrive too late to bring down the occiput, should endeavor to increase extension in this fourth position, by passing his finger over the left temple to the base of the lower maxillary bone, and, then, to make traction downward. A little pressure upon the left or pubic side of the head may also readily be made, so as to facilitate the rotation of the chin toward the pubis.

In the *fifth position*, the same treatment is applicable; excepting, that where the occiput cannot be drawn down, and greater extension becomes desirable, the finger of the practitioner may be passed over the right temple to the base of the lower jaw, and rotation should now be made in the opposite direction, so as to bring the chin on the right anterior inclined plane, under the arch of the pubis.

In the *sixth position*, if version by the vertex should be impracticable, the practitioner may devote his attention, almost exclusively, to produce a face presentation by promoting extension. This he may do at the commencement of the process by passing his fingers far back posteriorly, so as to push up the top of the head of the child; but when the process is advanced, he may gradually operate so as to get his finger over the lower maxillary bone, and by depressing it, increase extension, thus producing a sixth position of the face, which is by no means unfavorable.

From the above observations it may be seen that the occipito-anterior positions of the frontal presentation, where version by the vertex cannot be effected, are not so favorable as the occipito-posterior positions; inasmuch as these persistent frontal presentations are more readily converted spontaneously or artificially into those of the face. This of course is the reverse of what occurs in original presentations of the vertex, where the occipito-anterior positions are more favorable.

As already intimated, authors dismiss these presentations of the os frontis under the general denomination of irregular face presentations, into which they are so frequently resolved; but as the author has met with cases of *persistent frontal presentations*, and as, when not understood or improperly managed, dire consequences may result to the child and also to the mother, the mechanism of labor, so far as this process can be carried on, and the best means of rendering assistance, ought to be well understood.

The following case will be pertinent. The author was called in consultation, by a practitioner of considerable experience, to an impracticable case of labor; the

patient was found greatly exhausted from pain, severe hemorrhage, etc., being cold and almost pulseless. The physician confessed that "his midwifery was exhausted," medical and instrumental measures having been in vain employed. Upon examination, the os frontis was found near the centre of the pelvis, in the fourth position, with the chin toward the left acetabulum, and the parietal bones toward the right sacro-iliac symphysis; there being no labor pains, version was immediately determined upon. On passing the right hand for this purpose under the head of the child, the author was horror-struck to discover that the whole left side of the vagina, at the superior strait, was lacerated in a longitudinal direction, and that his hand was among the intestines. To effect version, the hand was carried toward the abdomen of the child, but there found the smooth peritoneal surface of the uterus indicating that the body of the child must be still within the cavity of the organ. The hand, therefore, was immediately withdrawn, followed by much hemorrhage. As no time was to be lost, the left hand was now carried in on the right side of the pelvis, along the spine of the child, into the uterus; the legs were embraced, and there was no difficulty in effecting delivery with the assistance of the right hand externally, pressing upon the fundus of the uterus, and by making traction effort upon the limbs of the child: the placenta also was readily removed, followed by a further discharge of coagula. Exhaustion was, of course, still greater, and unfortunately prostration and death ensued within the half hour.

In another case of fourth position of the os frontis, the apex of the forehead was detected toward the centre of the pelvis, but nearer to the left than to the right side, so as to give the impression that the chin of the child, although toward the acetabulum, was above the linea ilio-pectinea. In this case, it is evident, therefore, that spontaneous version into a face presentation was less likely to ensue, owing to the resistance of the brim of the pelvis upon the face when any bearing-down effort was made. Version by the vertex was immediately and efficiently accomplished; the child and mother doing well. It was rather singular that in a subsequent labor the same woman had again a frontal presentation, which was speedily relieved.

In another instance, the author was called to a case of a lady, whose labors were generally very easy, and who was very unwilling to submit to an examination before the rupture of the membranes and the bearing-down efforts were well established. In the present

instance the sensation of weight and pressure became so great, that she submitted to a proper investigation. The os uteri was found fully dilated, the bag of waters large, and the head already partially extruded from the os uteri, and occupying the fifth position of a frontal presentation. It was a most favorable moment for operating; the membranes were therefore ruptured, and the finger immediately passed upon the upper anterior portion of the os frontis, toward the right temple; a firm pressure was made upward, and at the same time backward, and as the head was not large, flexion and rotation were almost simultaneously accomplished, so that the occiput descended, rolled toward the pubis, and was speedily delivered.

It seems almost needless to observe that in these presentations of the os frontis, the forceps are altogether inapplicable, until the presentation has been completely changed.

Prognosis of Presentations of the Os Frontis.—The prognosis in frontal presentations must be regarded as unfavorable if the case be left to the natural efforts. We must believe that in some instances they will be persistent, and prove fatal to the child and the parent. In most cases, however, spontaneous version into a face presentation will ensue. This, of course, will generally be favorable to the mother and child; but it should not be forgotten that there are delays, sometimes dangers, and always minor troubles to the infant, even in the mento-pubic positions of the face. In the mento-sacral positions such delays and dangers are far greater, and, in some instances, the labor becomes impracticable when left to nature.

The prognosis, however, when the patient is attended by an instructed practitioner, may be regarded as favorable; for it is very seldom that ready conversion into a vertex presentation cannot be effected; and although the introduction of the hand may give some pain, this is not very severe, and will be transitory, and will give the patient the advantage of a natural presentation of the vertex.

In fixing the attention, therefore, of the profession upon the mechanism of labor and the treatment of frontal presentations, the author trusts that he has not needlessly multiplied the presentations of the head, or complicated the science of obstetrics. The general declaration that all such cases will be converted into face presentations he cannot regard as correct; and hence, when such presentations are persistent, the young practitioner requires directions for their relief, and, if possible, for their prevention.

CHAPTER XVIII.

DYSTOCIA.—COMPLICATIONS FROM FŒTUS.—MAL-PRESENTATIONS.

FACIAL presentations, as they are universally termed, might be more accurately designated as *nasal* presentations, inasmuch as the upper portions of the ossa nasi, in these cases, are found toward the centre of the pelvis. This alteration of name would be more in accordance with the definition given to the word "presentation."

PRESENTATIONS OF THE FACE.

It is very manifest that this presentation cannot occur unless the head be extended to the greatest possible degree, the base of the occiput being thrown to the back of the neck of the child. As, therefore, in presentations of the posterior fontanel, flexion must be perfected, so, in full presentations of the face, extension must be complete. Face presentations, therefore, are deviations from those of the vertex; the chin having departed more and more from the breast as extension advances, so that different portions of the child's head successively appear toward the middle of the pelvis, until finally the root of the nose may be recognized at its centre.

It should be observed that the "obstetric face" is more extensive than that described by anatomists; they limit the anatomical face by the orbits of the eyes, while the obstetrician extends the expression to the whole forehead, as formerly described. (Plate IV., Fig. 35.)

The face, being also comparatively a small surface, does not always present very regularly at the commencement of labor; hence, sometimes the forehead, sometimes one or the other malar bone, portions of the temples or even the chin may be felt before the contractions of the uterus are well established. But as soon as much force is applied to the head of the child, by the efforts of the mother, extension must be more and more increased, until the face becomes nearly or exactly parallel to the plane of the superior strait; inasmuch as the contractions of the uterus, operating through the spine, are now all directed toward the anterior part of the head, while the top of the head

being resisted by the uterus is pressed nearer and nearer to the neck of the child. As in vertex presentations, the demi-flexed position of the child's head rapidly disappears, under the influence of the contractions of the uterus, so as to perfect the occipital presentation; so also in the present instance, the demi-extended position of the head rapidly disappears, so that a complete or full presentation of the face necessarily ensues in the cavity of the pelvis. All these irregular presentations of the face may therefore be dismissed as of very minor importance.

We think, therefore, that it is unnecessary to divide these presentations into the primitive and secondary, as has usually been done by authors. Practically, we regard it as of no importance, and we know that full presentations of the face are often primitive. We deem it, therefore, of no advantage to speak of "brow" presentations, as designated by Ramsbotham, Jr., or of presentation of the "chin," or of the right or left "malar bone," as has been done by MM. Baudelocque and Chailly. We should suppose that extension is complete, and that the child's face is recognized at the orifice of the uterus or superior strait, with the forehead upon one side, and the chin upon the opposite side of the pelvis.

To the experienced practitioner, the *diagnosis* is very easy; the nose, the orbits of the eyes, and even the mouth can be readily recognized, and, of course, also the position which may be occupied by the child; the forehead, in this case, representing the back part of the fœtus, and the chin its anterior portion.

The *causes* are, of course, very obscure. Obstetricians very generally refer them to great obliquities of the uterus—Baudelocque to a wrong direction of the uterine forces. The best hypothesis, however, is that they arise from the spontaneous motions of the child; the head being fixed in this unusual posture by the contractions of the uterus.

Facial presentations, according to statistical reports, occur about once in two hundred and fifty or three hundred cases of labor; and therefore are comparatively rare.

Authors have differed as to the *number of positions* which should be adopted in face presentations. It has been customary to make four, but as these usually resolve themselves into two, according as the chin is to the right or left side of the pelvis, it has become customary to speak of but two positions of the face, under the denominations of the *right or left mento-iliac* positions. But as these face presentations are deviations from those of the vertex, it will be better in a systematic arrangement to treat of the six positions of the face, as we have done in other presentations; for it would be difficult to explain why six positions of the face should not be studied as accurately as six of the vertex. Indeed, as it seems to the author, and he hopes it will appear in the course of this investigation, it is of more importance, especially as the third and sixth positions of the face sometimes remain persistent, and are not changed so readily as similar positions of the vertex. He deems it, therefore, of practical importance to adopt the six positions of the face in accordance with the systematic arrangement thus far followed.

This principle is maintained also by M. Velpeau, who gives six positions of the face analogous to those of the vertex: and even M. Cazeaux, who, although he denies the existence of the pubic and sacral positions, and allows but two positions of the face, yet, nevertheless, subdivides each of these positions into three varieties, according as the chin is toward the anterior, lateral, or posterior portion of the pelvis; thus making six positions of the face, corresponding to the six positions of the vertex, according to his arrangement.

LEFT FRONTO-ANTERIOR POSITION.—This is a deviation from the *first* of the vertex. In a full presentation of the face in this position, the upper part of the nose will be recognized toward the centre of the pelvis; by tracing the bi-frontal suture, the top of the forehead will be found toward the left acetabulum, and the chin toward the right sacro-iliac symphysis. (Plate XXV., Fig. 125.) Hence, the fronto-mental diameter corresponds with the left oblique of the superior strait, and the bi-malar diameter with the right oblique. (Plate IV., Figs. 35 and 36.) The root of the nose will be observed opposed to the os coccygis, and hence the occipital protuberance will point toward the fundus of the uterus; of course, the occipito-frontal diameter will then correspond with the axis of the superior strait of the pelvis. The chin, therefore, represents the anterior portion of the body, while the posterior portion is represented by the superior surface of the cranium or sinciput.

It is manifest in this case that the os uteri being

dilated, there will be no difficulty in the transit of the face through the os uteri, inasmuch as the facial circumference and plane are comparatively small—its longest diameter (the fronto-mental) measuring but three inches. After the head, however, has passed, delay takes place in consequence of the anterior, or tracheal region of the neck, coming in contact with the edge of the os uteri; while the top of the head or anterior fontanel is upon the opposite side of the pelvis. Hence, the trachelo-bregmatic diameter succeeds the fronto-mental in correspondence with the left oblique, while the bi-malar diameter is succeeded by the bi-temporal, and this again by the bi-parietal diameter, which now corresponds to the right oblique of the brim. It is evident, therefore, that in all face presentations, the diameters of the head, which are especially involved, are the trachelo-bregmatic and the bi-parietal, the short diameters of the cranium.

The author, in his teachings, has been in the habit of terming the facial circumference and its diameters as *primary*; the trachelo-bregmatic circumference and its diameters as *secondary*. The first are those of the face, being small, and comparatively unimportant; while the second, those of the cranium, are the important ones involved in face presentations.

Considering the mechanism of labor, therefore, we must regard the expulsive efforts, operating through the medium of the spine, as, in the first place, increasing and confirming the process of *extension*, inasmuch as these effects are directed toward the front part of the neck, or, at any rate, if the extension be not perfect, toward the lower part of the face of the child. Hence, although at the commencement of the first period of this stage of labor, it is true that many authors have stated that the mento-bregmatic corresponds to the oblique diameter of this strait, and the forehead is toward the centre, yet, as the bearing-down efforts increase, the chin descends, and the occiput approximates the back of the child, so that the fronto-mental circumference becomes parallel to the plane of the os uteri and those of the pelvis. We say *parallel*, in unison with MM. Velpeau, Cazeaux, etc., and in opposition to M. Nægèlè and his followers, who contend that the face descends obliquely, one malar bone before the other.

Extension being completed, the head is forced down by the same efforts, not, however, very directly, inasmuch as the line of direction through the spine strikes upon the front part of the neck of the child, having a tendency, therefore, to push the tracheal region directly downward, so that the head, not receiving a direct impulse through the spine, may be conceived as being "dragged down" indirectly by the cervical vertebræ, rather than by a direct impulsion. Doubtless in this

way there is a loss of power, or, in other words, stronger bearing-down efforts are demanded in all face presentations.

This, however, is in a good degree counteracted by the resistance of the uterus and sides of the pelvis against the head, and also by the direct pressure made upon the occiput of the child through the medium of the uterus and the dorsal vertebræ. The combined influence of these forces, necessarily, therefore, force the head directly downward in the direction of the axis of the pelvis, so that the trachelo-bregmatic circumference comes down parallel to that of the superior strait and of the os uteri, although rather more effort may be required than in vertex presentations.

It is thought, also, by some that there is a loss of power, owing to the necessary anterior curvature of the cervical vertebræ, and perhaps of the dorsal, consequent upon the extension of the head; the loss in this way, however, must be very trivial, inasmuch as the spinal column is, in such cases, more straight than in vertex presentations.

During the *first period* of the second stage of labor, there may be some delay at the os uteri or superior strait, but this is not great, as the trachelo-bregmatic diameter soon passes, if the os uteri be relaxed, and the whole head descends into the cavity of the pelvis; (Plate XXV., Fig. 126;) the parietal protuberances having then passed the verge of the os uteri.

During the *second period* of the second stage of labor the process of rotation very universally takes place, and, as in fourth positions of the vertex, the rotation may occur anteriorly or posteriorly, according as the point of the chin, in this case, strikes the anterior or posterior inclined plane of the pelvis. If, therefore, in the descent of the head, the chin should be impelled against the spinous process of the ischium, it will receive an anterior direction, and it will gradually rotate toward the pubis, and the head will be delivered, as in the fifth position of a facial presentation. This, as will be soon observed, is a most favorable circumstance, and the tendency to its forward movement is certainly as great, if not greater, than in the fourth position of the vertex, arising not only from the fact that the anterior inclined plane is comparatively longer than the posterior, but also, we believe, from the great projection of the promontory of the sacrum, which, acting, in the first instance, on the side of the face, then upon the temple, and, finally, upon the parietal bones—a regular inclined surface—presses the face more and more from the posterior toward the anterior portions of the pelvis. Hence, the chin, as it descends from the superior strait, at the sacro-iliac symphysis, is directed somewhat anteriorly,

and, therefore, more frequently approximates the anterior inclined plane. This tendency to an anterior rotation in the mento-posterior positions of the face is, at the present day, confirmed by the experience of every practitioner, although the efficient cause, the greater length and the peculiar formation of the anterior inclined plane, has not been recognized.

Nevertheless, practitioners acknowledge that, in some instances, unfortunately, the rotation occurs backward, so that the chin is found at the sacrum, while, of course, the anterior fontanel rotates in the opposite direction, so as to become located directly behind the symphysis pubis. (Plate XXV., Fig. 127.) The face, therefore, now rests upon the posterior perineum, and, at the orifice of the vagina, will be recognized the upper portions of the os frontis. It may be observed here, that when the head is completely liberated from the os uteri, in a state of great extension, and passes down into the cavity of the pelvis, there is a diminution of the extension, the chin rising a little toward the sacro-sciatic notch or sacrum, and the forehead rather than the nose being recognized toward the centre of the pelvis, owing to the greater room which the head has in the cavity of the pelvis. This is in perfect analogy with the diminution of flexion which occurs in vertex presentations, when the head has been liberated from the cavity of the uterus.

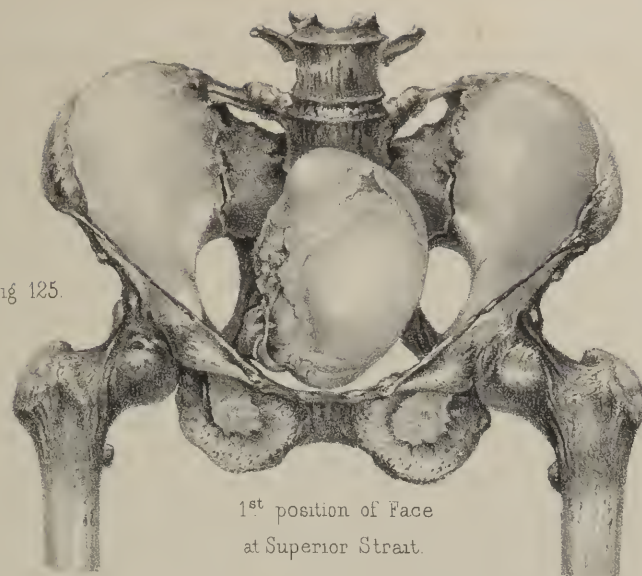
The question has been agitated by high authorities, especially by M. Cazeaux, whether, owing to the shortness of the neck of the child, the face can reach the bottom of the pelvis in these cases, inasmuch as it will necessitate the descent of the thorax with the head into the cavity of the pelvis; and hence, says M. Cazeaux, rotation of the chin must commence prior to the face touching the perineum.

The positive experience of almost every accoucheur is in opposition to this sentiment. MM. Velpeau, Chailly, and many others, positively affirm that the face not only reaches the coccyx, but, in many instances, that the chin will pass below the sacro-sciatic ligament, and will often distend the perineum to a great degree. This, we think, can be confirmed by various considerations.

First. The length of the neck is to be measured, not merely from the hyoid bone, but from the chin to the chest. When the head is in a state of extension, we would have at least three and a half inches, and, if the neck be elongated, probably four inches from the chin to the sternum. Hence, the assertion of M. Cazeaux that the neck is not long enough to allow the face to reach the perineum, even at the side of the pelvis, which measures about three and a half inches, is untenable.

Second. The neck can be elongated to a considerable degree in these cases of great extension.

Fig 125.



1st position of Face
at Superior Strait.

Fig 126.



in Cavity of Pelvis

Fig 127.



after Rotation

Fig 128



Chest engaged with Head.

Third. This disposition to elongate is, in some degree, counteracted by the propelling power of the uterus, etc., which, acting from above downward, causes the descent of the thorax against the head of the child, and, thus, has a tendency to diminish the length of the neck, and to counteract, to a certain degree, the elongation produced by the mere fact of extension.

Fourth. In cases where the chin is posterior, a portion of the thorax of the child may enter the superior strait with the occiput, (Plate XXV., Fig. 128,) allowing, even in these cases, the face to descend as low as the perineum. This arises from the fact, that there is considerable room at the superior portion of the pelvis, and, also, it is the mere apex of the thorax and the posterior extremity of the occipital bone which would be simultaneously engaged, in the antero-posterior diameter of the superior strait.

A *fifth* consideration may be added, viz.: That, if the neck of the child be much elongated, the suboccipital region of the head, which usually measures one and a half inches, will extend simply along the cervical vertebræ, and no part of the occiput will come in contact with the dorsal vertebræ; in other words, that, in cases of delay or difficulty, the portions of the child intervening between the pubis and the sacrum, or between the plane of the ischium, on one side, and that on the other, would be the thickness of the neck and that of the occipital region of the head. The dorso-sternal diameter may not be at all involved.

We think, therefore, it is evident that there is no mechanical obstacle, if the contractions of the uterus be powerful, to the face descending to the bottom or coccygeal region of the pelvis; and, therefore, that the head is not arrested by the apparent shortness of the neck of the child.

It may therefore, be safely deduced, from the above facts, that the difficulty in these occipito-anterior positions of the face (or posterior mental positions) arises, not from the shortness of the neck, nor from the length of the diameters of the head, augmented by that of the neck involved, but from the impracticability of the extension being carried to any greater degree; for, by the time the face reaches the perineum, the occiput is so pressed against the pubis, and the neck and thorax against the sacrum, that, notwithstanding the compressibility of these tissues, extension cannot be further increased. Arrest, therefore, of the head must take place, unless some other change in its position is established by natural or artificial efforts.

To the uninitiated who should, unfortunately, have to contend with one of these occipito-anterior positions

of the face, the above assertion seems strange; for he detects the top of the os frontis at the orifice of the vagina, and the forehead on the perineum, apparently ready to be born. Nevertheless, the head will be arrested, with the fronto-mental diameter stretching along the posterior wall of the vagina, the trachelobregmatic extending backward from the pubis toward the sacrum—this arrest having occurred from the impossibility of any increase in the process of extension. This we believe to be incontestably true in all cases where there is a due proportion between the size of the head and the cavity of the pelvis. This opinion is sanctioned even by Velpeau, Chailly, and others, who, although they describe the deliveries in these occipito-anterior positions, nevertheless intimate that the head was small and the pelvis large. M. Cazeaux, also, denies the possibility of deliveries, under these circumstances, “at term,” and considers them as constituting “one of the most serious difficulties of the obstetric art.” In truth, the child and mother would perish without scientific assistance.

Should, however, the head be comparatively small, and the perineum greatly relaxed, spontaneous deliveries, with the chin posterior, are said to have occurred in the practice of Smellie, De La Motte, Guilleminot, and others. MM. Velpeau and Chailly describe the mechanism of such deliveries in the following manner:—The strong bearing-down efforts of the mother continuing, the child's face will be found directly downward against the coccygeal plane, until, eventually, the chin passes the sacro-sciatic ligament, or os coccygis; then, the perineum is pushed directly downward by the face of the child, a partial flexion of the head occurs;—the chin pressing under the posterior margin of the inferior strait, while the os frontis, anterior fontanel, posterior fontanel, and, finally, the occipital protuberance, pass under the sub-pubic ligament, the occiput rises up in front of the pubis, and the further delivery, says Velpeau, ensues as in an original occipital presentation. In this way, the head passes the inferior strait, with its fronto-mental diameter parallel to the coccy-pubic; then the anterior part of the neck approximates the coccyx, and the trachelo-frontal, the trachelo-bregmatic, and the trachelo-occipital diameters appear, in succession, at the inferior strait. This process, however, is greatly resisted by the pressure of the chin against the posterior perineum; and it cannot be fully accomplished without such a distension of the perineum as to allow the whole occipito-mental diameter, measuring five inches, to intervene between the perineum and the symphysis pubis. It is evident, therefore, that no such deliverance can be effected, unless the child's head be

unusually small, and the soft parts greatly relaxed. The possibility, however, that the head may be delivered in this manner, should not be forgotten by the well-educated obstetrician.

By these gentlemen, it has also been supposed that even when the head remains within the pelvis, it is possible for the chin gradually to ascend along the face of the coccyx and the sacrum, so as to allow the top of the head, posterior fontanel, and, eventually, the occipital protuberance, to descend from behind the pubis, and the nape of the neck to come under the arch; or, in other words, the spontaneous conversion *in* the pelvis of a mento-sacral position of a face into a vertex presentation. This, it will be observed, necessitates that the occipito-mental diameter, measuring five inches, and often more, can be made to rotate between the pubis and the sacrum, which measures but four inches and three-quarters. It may also be safely asked, by what power can this supposed change be accomplished? We cannot conceive of any, for not only will the firm pressure of the top of the head against the symphysis pubis resist the descent of the occiput, and, of course, the ascent of the chin upon the sacrum; but the whole force of expulsion operating through the spine of the child, and directed toward the tracheloid region of the neck, will be in direct opposition to the ascent of the chin, and so far from allowing flexion, will have a tendency continually, as has been frequently remarked, to increase the extension. The cases which have been detailed to justify the representation of these authors were acknowledged to be those of small heads, and even in most of these the child was still-born.

Although it be true that, when the chin of the child is toward the sacrum and the vertex behind the pubis, no spontaneous change into a vertex presentation can occur if the head and pelvis are of their usual comparative size; nevertheless, we have long maintained that such a conversion might be artificially produced by rotating the chin toward the right sacro-sciatic foramen. The foundations for this opinion are,

First. That the oblique diameter of the pelvis at this place measures five inches. (Plate III., Fig. 12.)

Second. That the obturator and the sacro-sciatic foramina are occupied by soft tissues, and therefore are distensible.

Third. The occipito-mental diameter of the child's head, although measuring five inches, can be slightly diminished by pressure.

Hence, under favorable circumstances, a conversion of a facial presentation into an occipital one, although it cannot occur spontaneously, may be effected by artificial assistance. The mode of operating, under such

circumstances, will be designated when speaking of the treatment of these presentations.

We are happy to find that M. Cazeaux entertains a similar notion of the practicability of this mutation; although it does not appear that such a change has ever been effected, except in cases where the head was very small.

The subject ought not perhaps be dismissed without noticing the opinion of our cotemporary, Dr. Meigs, who asserts that, in some instances of occipito-anterior positions of the face where rotation of the chin toward the sacrum has ensued, powerful contractions of the uterus may drive the chin of the child beyond the coccyx, and along the whole length of the perineum to the fourchette, over which it passes, and then flexion commences around the tracheloid region as a centre—the anterior fontanel, the posterior fontanel and occipital protuberance successively appearing under the arch of the pubis. In this mode of delivery the child's head will pass presenting the fronto-mental diameter at the inferior strait and also at the vulva, necessitating an enormous extension of the head, so that the occipito-frontal diameter will correspond with the axis of the inferior strait of the pelvis; this certainly will be impossible, where the head is of ordinary size, even if we make every allowance of a most relaxed perineum. Premature children or twins may possibly escape in the manner indicated; but, we repeat, that at "term," when rotation occurs to the sacrum, the delivery is impracticable, unless a change be artificially effected in the position of the head.

RIGHT FRONTO-ANTERIOR POSITION.—In the *second* position of the face, a deviation from that of the vertex, we have the top of the forehead and afterward the anterior fontanel at the right acetabulum; the chin and afterward the tracheal region of the neck to the left sacro-iliac symphysis, while the right malar bone, and then the right parietal protuberance, is toward the right sacro-iliac symphysis. We have, therefore, the same diameters of the head corresponding to the same diameters of the superior strait as in the first position—the only exception being that the bregmatic extremity of the trachelo-bregmatic diameter now corresponds to the right instead of the left acetabulum, and the left extremity of the bi-parietal diameter to the left acetabulum, instead of to the left sacro-iliac symphysis, as in the first position of the face. The face and the head, therefore, descend with facility through the os uteri and superior strait; but as they pass into the cavity of the pelvis rotation must ensue in an opposite direction from what occurred in the first position. The chin, therefore, in this case, may strike upon the

spinous process of the ischium, so that it will rotate forward, and the second position of the face will be converted into a fourth position, which is of very frequent occurrence. In a few instances, however, the chin will strike posterior to the spine of the ischium, causing rotation to the hollow of the sacrum, as in the first position of the face, with the same consequences.

FRONTO-PUBIC POSITION.—This is a deviation from the *third* of the vertex; in this case, therefore, the top of the os frontis will be found against the pubis, the chin toward the promontory of the sacrum, the right malar bone to the right side of the pelvis, and the left to the left side. This position of the face is of far more frequent occurrence, relatively, than that of the vertex; for, the face being small, the fronto-mental diameter is readily accommodated in the short diameter of the superior strait, and the chin soon descends into the hollow of the sacrum; while the promontory of the sacrum, projecting under the lower jaw, would have a tendency to prevent a rotation of the chin of the child either to the right or left side, and the top of the head is easily accommodated behind the pubis. Such positions, therefore, are more apt to be persistent.

The mechanism of labor, as far as the process can be carried on, differs from that of the former positions simply in the fact that the trachelo-bregmatic diameter now becomes opposed to the sacro-pubic and the bi-parietal to the transverse diameter of the superior strait. The head therefore may, without much difficulty, be forced through the superior strait, till the face approximates the floor of the pelvis, there being, of course, no rotation. But by this time the chest of the child has descended with the occiput into the pelvis, preventing any further extension, and causing, therefore, an arrest of the head of the child, as in former cases.

RIGHT FRONTO-POSTERIOR POSITION.—The *fourth* position is the reverse of the first, and a deviation from the fourth of the vertex. The forehead is now at the right sacro-iliac symphysis, the chin toward the left acetabulum, the left malar bone toward the right acetabulum, and the right malar toward the left sacro-iliac symphysis; the fronto-mental diameter now corresponds to the left oblique, and the bi-malar to the right oblique. (Plate XXVI., Fig. 129.) As the head descends, the trachelo-bregmatic takes the place of the fronto-mental, and the bi-parietal takes the place of the bi-malar diameter; while, of course, the occipito-frontal corresponds to the axis of the superior strait. Therefore, during the *first* period of delivery, the head passes perpendicularly to the superior strait and os uteri, pre-

sending its trachelo-bregmatic plane parallel to that of the superior strait and os uteri. It descends during the *second* period, so as to bring the nose and forehead to the coccygeal region, its further descent being prevented by the resistance of the coccyx and perineum, and not by the shortness of the neck, as has been shown in sacro-posterior positions of the chin. During this descent, the chin now plays upon the left anterior inclined plane of the pelvis, and hence is determined forward, passing over the ramus of the ischium. (Plate XXVI., Fig. 130.) The perineum now yields more or less readily to the pressure of the face, and the chin, free from the bones, soon appears at the orifice of the vagina, and gradually ascends toward the pubis; of course, as the chin is thus elevated under the symphysis pubis, the occiput necessarily leaves the spine of the child, and descends posteriorly, so that by the time the chin is under the arch of the pubis, the occi-

Fig. 63.



Face Presentation. Chin anterior at the Inferior Strait.

put is in the hollow of the sacrum. In other words, owing to the great notch in the anterior part of the pelvis, extension, which had hitherto been kept up by the pressure of the base of the lower maxillary bone against the sides of the pelvis, rapidly disappears, and the process, therefore, of flexion commences, so that by the time the chin is at the symphysis pubis, exten-

sion has nearly disappeared, and we have now, at this *third* period of this second stage, the fronto-mental diameter corresponding to the antero-posterior diameter of the inferior strait, the bi-malar to the transverse diameter, and the occipito-frontal to the axis of the inferior strait. The face, being small, now rapidly advances until the tracheal region of the neck comes to the symphysis pubis, and the anterior fontanel to the os coccygis; that is, until the trachelo-bregmatic diameter corresponds to the coccy-pubic, and the bi-parietal to the bis-ischiatic of the lower strait. (Plate XXVI., Fig. 131.) Having, therefore, the short diameters of the cranium thus favorably arranged at the outlet of the pelvis, there is no unusual mechanical difficulty, at this third period of delivery, for the transit of the head through the inferior strait.

During the *fourth* period, the neck of the child, behind the symphysis pubis, arrests, for the time, the progress of the head in that direction, while the whole head, being driven downward by the expulsive efforts—acting now, not only through the medium of the spine, but upon the base of the occiput—the forehead describes the curve along the posterior wall of the vagina upon the sub-pubic ligament as a centre, (to which the tracheal region of the neck is applied,) until it reaches the posterior commissure, and the whole face will appear at the vulva. The same process continues until the posterior commissure of the vulva reaches the top of the head; the os vaginæ is distended more and more, until we have the trachelo-bregmatic plane parallel to that of the orifice of the vagina; the trachelo-bregmatic and bi-parietal diameters corresponding to the antero-posterior and transverse diameters, and the occipito-frontal diameter corresponding to the axis of the orifice. As soon as the edges of the orifice slip over the parietal protuberances, the chin rises rapidly in front of the symphysis pubis, while the posterior commissure of the vulva glides over the parietal and occipital bones, receding to the nape of the neck. The whole head is thus born; the lower jaw being in front of the symphysis pubis, the occiput in front of the perineum; (Plate XXVI., Fig. 132;) while the neck of the child is still behind the pubis, the bones of the pubis thus intervening between the neck on the inside of the pelvis, and the lower jaw on the outside.

It is manifest, therefore, that during this fourth period of delivery, the occiput descends rapidly along the concavity of the sacrum, os coccygis, and perineum, to the vulva; that thus the process of flexion, owing to the arrest of the front part of the neck at the pubis, is continually augmenting, until the complete delivery of the head, when the flexion is as perfect as practicable, having merely the thickness of the bones of the pubis

intervening between the chin and the sternum of the child. The rapid flexion of the head upon the tracheloid region pressed against the sub-pubic ligament is effected,

First. By the powerful bearing-down efforts of the mother, acting directly, through the spine of the child, downward toward the coccygeal region; and,

Second. By the resistance made by the posterior and anterior perineum preventing further descent, and hence compelling the head to advance in a diagonal direction toward the orifice of the vagina. The head, therefore, may be regarded as a lever of the first kind, the fulcrum being at the symphysis, and the power directed against the occiput, so as to cause its descent, and necessitating the elevation of the chin forward toward the front of the pubis.

The delivery, therefore, of the head of the child through the vagina, in the fourth position of a facial presentation, is precisely analogous to that of the vertex. In both cases the perpendicular diameters of the head are concerned, the top of the head passes rapidly over the posterior walls of the vagina, and revolving upon the sub-pubic ligament as a pivot; the only difference being that, in vertex presentations, the base of the

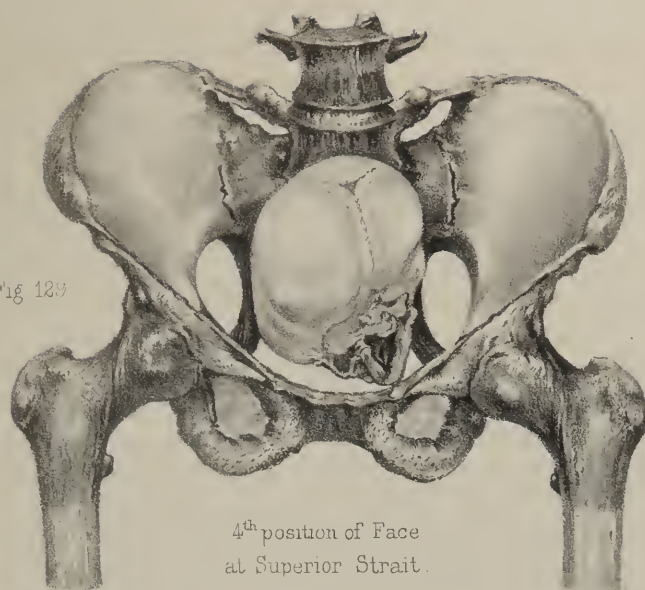
Fig. 64.



Transverse Position of the Face at the Superior Strait.

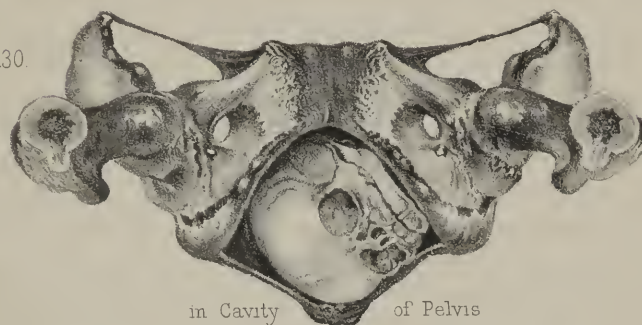
occiput is applied to the sub-pubic ligament, while the process of extension is carried on, but, in facial presen-

Fig 129



4th position of Face
at Superior Strait.

Fig 130



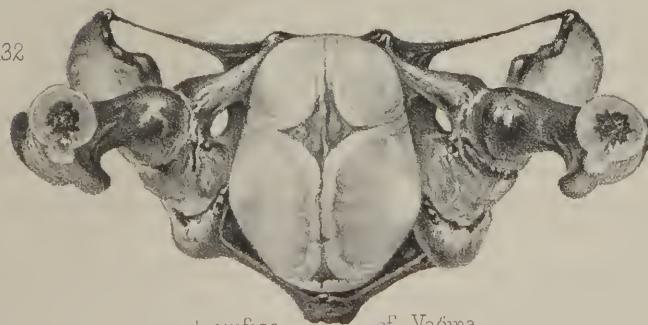
in Cavity of Pelvis

Fig 131



at Inferior Strait

Fig 132



at orifice of Vagina

tations, the tracheal region of the neck is fixed at the sub-pubic ligament, while the process of flexion takes place. There is, mechanically, therefore, so far as the diameters of the head are concerned, no real difference between the two presentations. It is a matter of little importance, whether the trachelo-bregmatic or cervico-bregmatic is engaged at the inferior strait, and at the orifice of the vagina. It should be remarked, however, that, in vertex presentations, it is the occipito-mental diameter which corresponds to the axis of the obstetric canal, while, in nasal presentations, the occipito-frontal diameter corresponds to this axis, from the commencement to the termination of this process.

The head being thus born, in a state of great flexion, in this fourth position, restitution immediately occurs, if the neck be twisted; and the chin will point toward the left groin, and the occiput toward the right tuber of the ischium.

Under this fourth position of the face, there should be included all those various positions where the chin strikes on the left anterior inclined plane of the pelvis, embracing, therefore, *transverse* positions, and many where the chin descends posterior to the middle line of the pelvis. In all such cases there is a natural disposition for it to rotate anteriorly.

LEFT FRONTO-POSTERIOR POSITION.—This is the reverse of the second and a deviation from the *fifth* position of the vertex. In this case, the fronto-mental diameter now corresponds to the right oblique, and the bi-malar to the left oblique. Hence, if the head descends into the cavity of the pelvis, rotation will occur in the opposite direction, so that the chin will rotate from right to left, on the right anterior inclined plane of the pelvis, until it passes the right ramus of the ischium, appearing under the arch of the pubis. With the exception of this difference of rotation, the whole mechanism of delivery is precisely the same as in the fourth position.

In this case, however, after delivery of the head, restitution will bring the chin of the child pointing to the right groin, and the occiput toward the left tuber of the ischium.

This position includes all those where the chin plays upon the right anterior inclined plane, whether *transverse* or *oblique*.

FRONTO-SACRAL POSITION.—This is the reverse of the *third* and a deviation from the *sixth* of the vertex. The same diameters of the face are here concerned, but in this case the fronto-mental diameter corresponds to the short or sacro-pubic diameter, and the bi-malar to the long or bis-iliac diameter of the superior strait. This fronto-sacral or mento-pubic position is compara-

tively not unfrequent, and very generally persistent, inasmuch as the under part of the jaw is well accommodated by the concavity of the pubis; and the face being small, descends readily through the superior strait, until the anterior fontanel comes to the promontory of the sacrum. There may be some tendency, owing to the convexities of the top of the head, and the promontory of the sacrum, for the head to turn to the right or to the left of the lumbar vertebræ; this tendency is probably not great, owing to the yielding character of the anterior fontanel upon which the promontory of the sacrum is pressed, and thus to a certain degree resisting the deviation to one side or the other. The head now descends in the direction of the axis of the superior strait till the face strikes the perineum, and the front part of the neck comes to the symphysis pubis; extension being continued till this time, owing to the top of the head being pressed by the resistance of the sacrum against the spine of the child. But now the head is so far depressed, that the vertex passing the promontory of the sacrum may descend along its concavity, and thus allow the chin to ascend upon the plane of the perineum toward the symphysis pubis; in other words, to permit flexion to occur, so that the face, and afterward the trachelo-bregmatic circumference, may present at the inferior strait, and delivery be accomplished as in the fourth or fifth positions.

Hence, although the short diameter of the superior strait is concerned in this sixth position of the face, yet delivery occurs with perhaps more facility than in the other positions, owing to the slight depth of the pelvis, anteriorly, allowing flexion to occur as soon as the occiput of the child can sink under the promontory of the sacrum; while in the oblique positions flexion cannot occur until rotation is far advanced, so as to liberate the chin of the child from the sides of the pelvis.

Prognosis of Presentations of the Face.—It is manifest from this account that the fronto-anterior positions of the face, or what are usually termed mento-posterior positions, are far less favorable than the fronto-posterior or mento-pubic, owing to the fact that there is a liability of the fronto-anterior positions of the chin rotating to the sacrum, pregnant with dangerous consequences; while in the fronto-posterior positions of the face, the chin rotates under the arch of the pubis, where flexion may occur and delivery be effected with great facility, favorable diameters being presented to the various planes of the pelvis and vagina in the manner just explained.

Let it not be forgotten, however, that in a very large proportion of first and second positions of the face, and of course, also, in the transverse positions usually

termed right and left mento-iliac positions, the chin of the child, owing to circumstances already detailed, will strike upon the right or left anterior inclined plane of the pelvis; so that rotation of the chin will occur anteriorly toward the pubis; and it is comparatively in but few cases that the chin rotates posteriorly toward the sacrum. Experience, indeed, proves that the rotation posteriorly is so rare, that many authors seem to ignore the fact that it may sometimes occur, and therefore, without reference to such cases, they venture to arrange facial presentations under the division of natural or unassisted labors. This, however, cannot be right, as it might lead the inexperienced practitioner to trust all cases of face presentations to the unassisted efforts of the mother, which might result fatally to the child, and even to its parent, when rotation occurs posteriorly. Indeed, in all the occipito-anterior positions of the face, much delay and difficulty, and even danger may result to the child, from the slowness in which rotation may be accomplished, even when the chin advances toward the pubis.

Again, let it be remembered, that in all cases of face presentation, even in the occipito-posterior positions, much of the expulsive power of the uterus, etc., is lost, in consequence of the force being directed upon the neck of the child, rather than upon its head, as formerly explained; and also perhaps on account of the posterior curve of the cervical and dorsal vertebræ, which must occur when the head is greatly extended.

Another consideration of some importance when the face presents, is the swelling of the features, from the infiltration of serum and blood into areolar tissue. Hence ecchymosis, or even bloody tumors, may be formed in some parts of the face; there is often also a great congestion, and sometimes effusion, under the conjunctiva of the eye. Although these accidents are seldom important, the blood, etc., being rapidly absorbed after birth; yet they give an unsightly appearance to the child, and sometimes, as in analogous bloody tumors of the scalp, inflammation and even suppuration, or perhaps mortification may ensue, to the permanent injury of the features of the child. It is the opinion of many authors also that these congestions of the venous system are not confined to the external tissues, but that in many instances, owing to the pressure of the os uteri and of the os vaginæ, on the large external jugular veins, congestion of the brain to a dangerous or even a fatal extent may ensue.

It is a common remark, that in a large number of face presentations, injury has been inflicted on some of the nerves of the face, causing irregular contractions or a semi-paralytic condition of the muscles about the mouth or eyes. These, however, are usually transitory.

We think, therefore, that face presentations, although often accomplished with safety to the child and the mother, should be placed under the head of complicated labor; for in all cases there is necessarily a loss of power from the direction in which the bearing-down efforts operate, rendering labor tedious and painful to the mother. This tediousness is augmented whenever the head descends transversely, and especially when the os frontis is toward the anterior part of the pelvis; while in those cases where the os frontis comes directly to the pubis, either primarily or secondarily, the dangers to the mother are excessively great.

To the child, also, such presentations are not as favorable as those of the vertex; for the features may be seriously injured, and the life of the child may be compromised by the greater tediousness of delivery. There is great danger of cerebral congestion, from pressure on the jugular veins, even in favorable cases; while death is almost inevitable in mento-sacral positions.

These views are confirmed by statistics; for, as M. Chailly observes, even when the chin rotates anteriorly, the deaths are in the proportion of one in ten; and when it rotates posteriorly, few children survive. Dr. Churchill's summary of statistics shows that the death of children in facial presentations is about one in seven; Madame Lachapelle reports that in seventy-two cases there were nine deaths, or one in eight.

There are few circumstances more gratifying to the scientific obstetrician than the light which has been thrown, by comparatively late investigations, upon the mechanism of labor in face presentations; for which knowledge we are chiefly indebted to the French accoucheurs, especially, it is believed, to Madame Lachapelle.

M. Portal, it is stated by Professor Simpson, in 1685, declared that nature was adequate to her own work. His opinion had very little influence, but it was revived by Dr. Wallace Johnson, in 1769, also by Delleurye, Desormeaux, S. Zeller, and Boër; but, according to Velpeau, Madame Lachapelle seems to deserve the credit of establishing the general safety of face presentations, and of arranging them under the head of natural labors. In this she has been followed by many modern accoucheurs, such as MM. Velpeau, Chailly, Cazeaux, Churchill, Simpson, Meigs, Bedford, etc.

We have already stated our reasons for retaining facial presentations under the head of complicated labor, though we gratefully acknowledge that in a large number of cases delivery may occur spontaneously. The knowledge of this fact, and the mode by which it is accomplished, and our more accurate acquaintance with the character of the difficulties which render

facial deliveries tedious, painful, and sometimes even impracticable, have greatly augmented the resources of modern accoucheurs. Hence these presentations are no longer the dread of practitioners. Formerly they were all regarded as demanding the early interference of art; hence the resort, therefore, to the dangerous operations of version, of the forceps, or even of craniotomy—which operations, owing to the ignorance of the mechanism of labor, were often untimely, injudiciously, and ignorantly performed. Thus, far too frequently the life of the child has been sacrificed, the tissues of the mother injured, and even her health and life been involved; while now he, who understands accurately the mechanism of labor, can, by the most simple measures, facilitate nature's operations in accomplishing delivery, or, by a timely interference, convert the presentation of the face into the still more favorable one of the vertex, and thus escape even the unavoidable inconveniences and delays incident to face presentations.

The author has, as distinctly as possible, stated what he believes of the mechanism of labor in face presentations, without criticising to any extent the opinions of other writers. Universal experience has demonstrated the great error of M. Capuron, in declaring that such deliveries were impossible on geometrical principles. Errors of a minor character still exist in the profession as to the modes of delivery in facial cases. As the influence of M. Cazeaux is deservedly very great, the author thought it right to object to the declaration that the descent of the face to the floor of the pelvis was prevented by the shortness of the neck. We think another and still more grave error has been made by this excellent accoucheur, in placing the chin of the child, after rotation has occurred, at the pubis, and declaring that the mento-bregmatic diameter, measuring four inches, was concerned at the inferior strait. M. Cazeaux, also, although stating that the mento-frontal circumference was parallel to the plane of the pelvis, declares that the diameter drawn from the posterior fontanel to the child's upper lip corresponds to the axis of the pelvis, instead of the diameter from the occipital protuberance to the root of the nose—that, is the occipito-frontal, which is the one really involved.

Treatment of Presentations of the Face.—Founded, therefore, upon the principles deduced from our knowledge of the mechanism of labor in these cases, the treatment during the several periods of the second stage of labor may be readily stated. If the practitioner be called early, and recognize a face presentation, after the os uteri is dilated, and before the presenting part has passed this opening, the author thinks that, in all cases, it would be best immediately to resort to *version by the vertex*. For, under the circumstances just men-

tioned, especially in multiparous women, the operation can be easily and rapidly performed without much suffering to the mother, and will effectually deliver the child and its parent from all the unpleasant incidents, delays, and even dangers of facial presentations.

This advice is especially important in all the occipito-anterior positions, inasmuch as there is danger of the chin rotating to the hollow of the sacrum; and even in occipito-posterior positions, where the chin comes to the pubis, the labor will be shortened, the sufferings of the mother diminished, and the safety of the features, and even the life of the child will be better insured. Authorities, however, do not coincide with the recommendation now given. Many prefer even podalic version, while most others represent version by the vertex as very difficult, painful, and often impracticable. No doubt this last criticism is true, if the operation be undertaken, as has been often advised, after the face has passed the verge of the os uteri, or even when it has descended to the floor of the pelvis; under such circumstances it must, indeed, be very difficult and dangerous, and, we should think, very frequently fatal, not merely to the child, but to the parent. If, however, it be timely performed, as above indicated, the author has not found it difficult of execution or productive of any mischief, except some additional pain, which is transitory, arising from the introduction of the hand; while we secure all the great comparative advantages of a vertex presentation.

If, however, the practitioner be not present until the face has passed the circle of the os uteri, it will be wrong to resort to version, either by the feet or vertex, for reasons which have been already stated.

The indications in the management of these last cases are now very apparent, founded on our knowledge of the mechanism of labor, and generally can be readily fulfilled.

The important indication, during the second period of this stage, in the *first position*, is to insure the rotation of the forehead posteriorly, and, of course, the chin to the anterior part of the pelvis. This, as has been shown, will often occur spontaneously; but this is tedious, painful, and, it may be, dangerous: sometimes there is no rotation, and, in a few instances, the chin will be turned to the hollow of the sacrum. The author, therefore, cannot coincide with the advice so generally given at the present day, of trusting such cases to nature, even for a short time, for, in his opinion, "delay is now dangerous;" one single bearing-down effort of the mother may determine the chin posteriorly, perhaps to the irreparable injury of both child and parent; and hence it is the positive duty of the practitioner to *insure* anterior rotation.

Even when it is evident that the natural operations will be efficient to convert this occipito-anterior into an occipito-posterior position, yet still this important change should be facilitated, so as to hasten the delivery, and thus contribute greatly to the welfare of both mother and child. This important indication can generally be very effectually done, simply by means of the *finger*, which, in this case, is to be carried immediately toward the right temple of the child, and passed, as far as practicable, along the side of the head beneath the parietal protuberance, so as to direct the whole top of the head, from the left anterior inclined plane backward toward the posterior inclined plane. Thus the chin should rotate in the opposite direction, from the posterior portion of the pelvis on the right side toward the anterior, thus gradually converting the first into a fifth position of the nasal or face presentation; of course, this manœuvre is powerfully assisted by the anterior inclined plane of the pelvis as soon as the chin of the child strikes upon the anterior surface of the spine of the ischium.

It is manifest that as the direction of the uterine powers falls upon the neck or lower part of the face of the child, the pressure which has just been recommended, has a very great mechanical advantage, inasmuch as the head is now out of the uterus and in the cavity of the pelvis, and, therefore, there is plenty of room; the fronto-mental and trachelo-bregmatic diameters corresponding to the oblique diameters of the pelvis.

Moreover, the pressure made by the finger has great power, not only from the mobility of the head in the pelvis, but from the head being used as a lever, the long arm of which extends from the base to the sinciput, while the short arm is simply the neck and lower part of the face. The great flexibility of the neck contributes also greatly to the efficiency of the pressure made upon the side of the head. An additional effect, in a mechanical point of view, arises from the pressure being made beneath and against the parietal protuberance, which renders such pressure much more efficient than when applied simply to the side of the os frontis.

In this operation the practitioner can perhaps always be successful, owing to the power which he can thus exercise, and also to the natural disposition of the chin to rotate forward when it strikes the anterior inclined plane of the pelvis. He will thus have the satisfaction of preventing any tendency of the chin to rotate posteriorly, and even when, without assistance, it would rotate anteriorly, yet a judicious pressure in the manner indicated will *facilitate* the rotation and thus shorten the labor, diminish the sufferings of the pa-

tient, and increase the probabilities of a safe delivery to the child.

The only objection which can be presented in opposition to the plan detailed, is that the child's chin would thus describe at least one-third of the circumference of a circle before it can reach the symphysis pubis, and therefore there might be a dangerous twist in the neck of the child, so as to injure the spinal marrow. This is a theoretical but not a practical objection, inasmuch as we know such changes spontaneously take place, the child being usually born alive. In a case which occurred to the author, where the chin was far back toward the sacro-sciatic foramen, anterior rotation with a little pressure upon the side of the head ensued very rapidly—the child breathing immediately after birth. We know, also, that in fourth and fifth positions of the vertex, the occiput rotates anteriorly in many instances to the same extent with perfect impunity. The explanation of this important fact is two-fold. In the first place, that when this rotary process gradually occurs more and more during successive contractions of the uterus, the twist in the neck can be extended to a very great degree with impunity to the spinal marrow; and, in the second place, that as this twist takes place in the neck, the shoulders of the child will also rotate to a certain degree with the head, and in this case, therefore, the right shoulder will gradually pass from the right acetabulum nearer and nearer toward the pubis, so that the twist in the neck will not be so great as would otherwise be demanded. In facial presentations also it is probable that this favorable change in the position of the shoulders will more rapidly occur than in vertex presentations, inasmuch as the occiput, thrown back upon the spine, will, in this first position, press somewhat upon the left scapula or shoulder, so as to determine it from the left sacro-iliac symphysis toward the sacrum, as the head rotates in the opposite direction.

The practical rule, therefore, to be deduced from these facts, is, that as such rotation is all-important for the safety of the child and the mother, it should be attempted even at a great risk to the child. This risk, however, to the infant is, we believe, not great, when the operation is judiciously performed. The accoucheur should never attempt to produce rotation suddenly, but always in the most gradual manner, by making his pressure on the side of the head at intervals, and during the recurrence of each successive "pain," and thus carefully imitating the natural process of delivery.

If it should unfortunately happen, from the size of the head or other untoward circumstances, that this desirable anterior rotation cannot be effected by the

fingers of the practitioner, after successive trials, he will be justified in passing a *vectis* over the forehead and deep into the cavity of the pelvis, and then by depressing the handle the concavity of the *vectis* may be directed over the left side of the face and temple. (Plate XXVII., Fig. 133.)

If the *vectis* be not at hand, one blade of the forceps, and in this position of the face, the right or female blade may be advantageously employed as a substitute.

The practitioner may, in this way, accomplish rotation even where the fingers should fail. We can perceive no objection to this operation from any supposed danger to the features of the child, inasmuch as the instrument should be carefully carried toward the left side of the pelvis, over the *os frontis*, and not over the face, and its action will be on the *side* of the face and temple, and not over the features. Moreover, this instrumental operation is only necessary when other means have failed, and where the still more dangerous operation of the forceps will be demanded, or the chin be allowed to rotate toward the sacrum.

It is in these cases that the application of the *forceps* has been very universally recommended, and perhaps a judicious attempt might be made, provided other means have entirely failed and the child be still living. The objections to the operations are, first, the difficulty of carrying the handles of the forceps sufficiently far back that the blades may be applied parallel to the occipito-frontal diameter; and, second, the necessity, when applied, of causing rotation to occur posteriorly, inasmuch as the concave edge of the forceps, which is toward the top of the head, must be brought to the pubis, and the convex edge, which corresponds to the base of the cranium, will be toward the sacrum. The child will now be exposed to all the delays and dangers incident to these mento-sacral positions, as formerly detailed, and which render such cases impracticable by the natural efforts. Hence, the experienced Madame Lachapelle declares that the forceps ought not to be employed, if the child be still living.

To obviate these dangers Professor Simpson advises the chin to be rotated forward until it be toward the plane of the ischium. Then, if the curved forceps be employed, they should be removed, and, if necessary, re-applied, so that the concavity of the blades should correspond with the base of the cranium.

M. Blot has operated successfully in thus bringing the chin to the pubis by the forceps. M. Cazeaux, however, declares that it is very difficult of execution, and very dangerous to the infant, from the liability of injuring the spinal marrow. The operation has often

failed in the hands of the best accoucheurs. In the first editions of his work he, therefore, recommended posterior rotation by the forceps, but so many favorable cases have since been reported, where the head was rotated anteriorly, that he now recommends that it should always be attempted before resorting to ulterior operations. This opinion is, doubtless, correct; and if the operation be very slowly executed, this anterior rotation by the forceps, with all its dangers, is more safe for the child than the posterior rotation, which is very universally fatal. Nevertheless, the forceps ought seldom to be employed; such rotation can be as effectually accomplished with far more safety to the child and the parent by the *vectis*, or by one blade of the forceps acting as the *vectis*, upon the sacral side of the head.

Dr. Meigs details an interesting case confirmatory of these views, in which the face presented in the second position, and the descent had advanced until the face was low down, the chin toward the sacro-iliac foramen and the top of the head toward the right foramen thyroideum. Dr. M. failed in attempting to bring down the occiput by the *vectis*; he also failed after applying the forceps, and finally succeeded by means of the lever in effecting rotation of the chin forward. The child was born asphyxiated, but revived.

The practitioner may not, however, be summoned until the posterior rotation of the chin, and, of course, the anterior of the *os frontis* have actually occurred. In these most unfortunate cases, which have hitherto been considered, when the head and the pelvis are of their natural size, as necessarily fatal to the child, and too frequently to the mother, much may now be anticipated from our present more accurate acquaintance with the mechanism of labor and the ample resources of nature and science.

The child being alive, we should unhesitatingly recommend the attempt to produce, very gradually, *rotation of the os frontis* from the anterior to the posterior part of the pelvis, and, of course, to determine the chin from the sacrum to the side of the pelvis, and eventually to the vulva. This, we think, can often be accomplished by the finger acting upon the side of the head in the manner already directed, assisted, in some instances, it may be, by the *vectis* or one blade of the forceps acting upon the sacral side of the face and temple.

We know of but one objection to this operation, which in itself is not very difficult of execution. This objection, however, is certainly of the most serious character: the head would describe a complete semicircle, greatly endangering, therefore, a fatal injury to the spinal marrow. As to the reality of this danger

there can be no doubt; but in the author's opinion there is no necessary fatality in such instances, inasmuch as a number of cases have occurred of the head describing rotations in the pelvis to the extent of not merely one-half, but even to that of three-fourths of a circle, with impunity to the life of the child. Some of these have already been quoted. We know also that a rotation to the extent of one-third of a circle can very universally in vertex, as well as in face presentations, be effected with impunity, and as we have remarked, that when such rotation is gradually accomplished, there is great reason to hope that the thorax will rotate with the head, thus diminishing the danger of spinal lesion; and, finally, it is a choice of evils, and in our opinion the danger is less to the child, by this mode of operating, than by any other at our command.

Should the practitioner fail in producing anterior rotation, from the size of the head or other causes, a judicious effort may be made with the *forceps*. This practice is almost universally recommended by authors, but certainly it presents but a forlorn hope for the safety of the child or the tissues of the mother. This has already been shown, when speaking of the mechanism of delivery. Still, it may be sometimes justifiable when the head is small, and the perineum greatly relaxed, to apply the blades of the forceps, as accurately as possible, in the direction of the occipito-frontal diameter of the head, which, of course, would necessitate that the handles be carried far back, and pressed firmly against the perineum. Traction effort should then be made downward and slightly forward, until the chin passes the posterior margin of the inferior strait, when the handles should be again slightly depressed, and the head drawn firmly against the perineum, under the hope that this tissue may yield sufficiently to allow the occiput to pass under the arch of the pubis.

In this way it may be occasionally practicable to deliver even a living child under these circumstances. Let it be remembered, however, 1st. That if the head be of the usual comparative size, and the perineum rigid, the child cannot be born in this manner. 2d. That the difficulty of applying the forceps accurately is very great. 3d. That the tissues of the mother, even when greatly relaxed, must be enormously distended to allow, not only the occipito-frontal, but the occipito-mental diameter, to revolve between the posterior perineum and the sub-pubic ligament. Hence, the most imminent danger will exist of rupturing the perineum, and even the rectum; and, 4th. The slight probability that the child will survive under these accumulated obstacles to a safe delivery.

There is still another method which has been suggested, when the chin has rotated toward the sacrum.

It has been already stated that some accoucheurs have observed the spontaneous conversion of a face into a vertex presentation in the cavity of the pelvis. Hence, it has been inferred that this desirable change might be effected artificially. The author has, for many years, been convinced of its practicability, but has had no opportunity of testing the correctness of his views, and the cases reported leave it doubtful whether this version by the vertex in the cavity of the pelvis has ever been accomplished when the head is of the usual proportional size. Of course, in premature children, or, in cases of twins, no difficulty can exist.

The *vectis* or lever has been several times recommended, but so indefinitely, that the mode in which it has been employed has not been accurately determined. No doubt the application must always be difficult, as the occiput is high up behind the pubis, and pressing closely against the neck and thorax. It might, however, in some instances, be insinuated along the left side of the head toward the sub-occipital region, carrying the handle at first far back toward the perineum, and then, after the point of the instrument has reached the parietal protuberance, slightly elevating the handle, so as to direct the extremity of the blade, between the head and the neck. Command, to a certain extent, may thus be obtained over the occiput, which may be drawn forward against the pubis, and also downward; while the fingers of the opposite hand may be applied on the os frontis, which may be pushed up, and thus facilitate the descent of the occiput, and the consequent flexion of the head.

This effort to produce version by the vertex has also been attempted by the *forceps*; with this object, the blades should be passed over the parietal protuberances, and in the direction of the cervico-bregmatic diameter of the head. Then traction being made downward, the occiput may descend, while the forehead, face, and chin ascend on the posterior surface of the pelvis.

We must, however, believe with M. Cazeaux, that in a well-formed pelvis, and with the head fully developed, that neither of these operations with the *vectis* or *forceps* can be accomplished, when the chin is toward the hollow of the sacrum, unless by great force, endangering the life of the child, and the tissues of the mother; for it is evident that the whole occipito-mental diameter, measuring at least five inches, must revolve between the pubis and the sacrum, where the antero-posterior diameter does not exceed four and three-quarter inches. Of course, therefore, the operation could only be successful where the head is but comparatively small.

Fig 133.

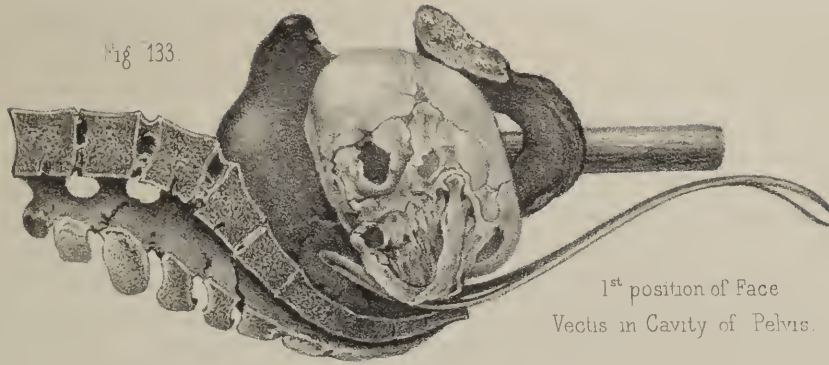


Fig 134



Fig 135.

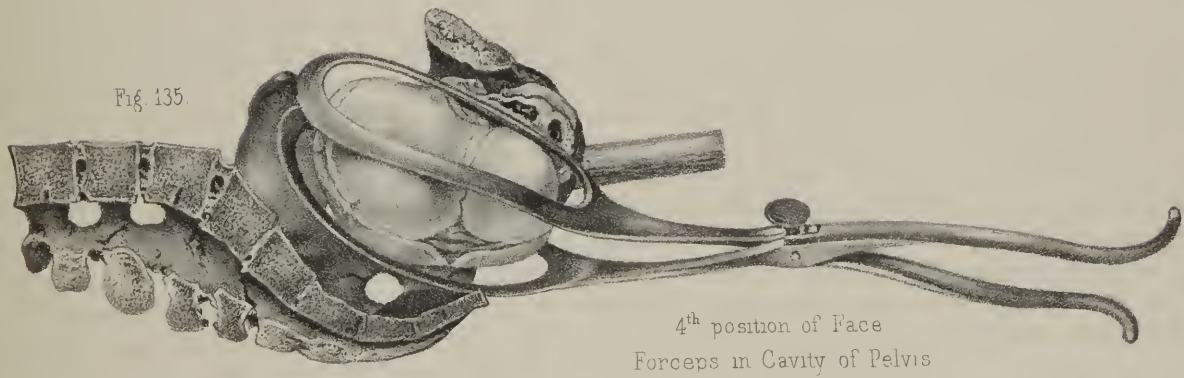
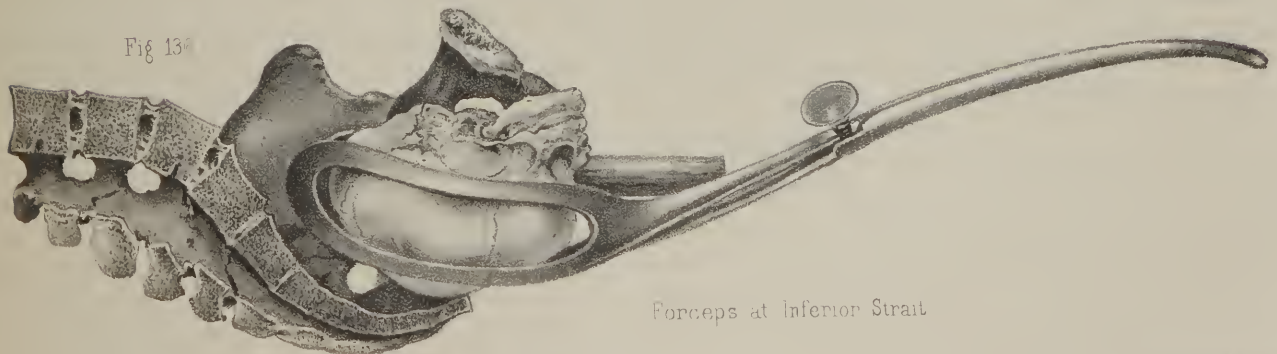


Fig 136



The author has long believed that there is room for version of the head in the pelvis, between the foramen thyroideum and the great sacro-sciatic foramen. We have already stated that this diameter in the second parallel plane, (Plate III., Fig. 12,) measures at least five inches, which would, therefore, correspond to the occipito-mental diameter of the head. Therefore, if the head be in an oblique position, we see no reason, especially allowing for some yielding of the soft tissues, which occupy the above foramina, and for slight compressibility of the head in the direction of its occipito-mental diameter, why the head may not be made to revolve, when it has descended into the pelvis between the superior and inferior straits. We are happy to find the same opinion has been expressed by M. Cazeaux, who denies that the head can be made to revolve directly between the pubis and the sacrum.

The treatment, therefore, should be, that, if the anterior rotation cannot be effected in these mento-posterior positions of the face, version by the vertex should be attempted in the pelvis.

Hence, should the practitioner find the face upon the coccyx and perineum, and the top of the head behind the pubis, his first object should be by pressure, say upon the right side of the head, to determine the anterior fontanel toward the left ramus of the pubis, and then to the foramen thyroideum. This being accomplished, the lever might be conducted on the right side of the head to the base of the occiput, to cause its descent in the manner already indicated. This, we have already declared to be difficult, and would, doubtless sometimes be ineffectual.

The *forceps* would be unavailable when the head is oblique; the blades could not be applied over the cervico-bregmatic diameter.

The author has long thought that this would be another case in which the much neglected *fillet* might be most advantageously employed. If, for example, a strong fillet, well quilted or stuffed in the central portion, could be passed between the neck of the child and the occiput, and be directed over the sides of the head parallel to the cervico-bregmatic diameter, (Plate XXVII., Fig. 134,) it is manifest that traction might be powerfully made by an assistant downward, while the fingers of the right hand of the practitioner within the pelvis could protect the mother's tissues, and give a proper direction to the tractive force. The fingers of the left hand should be directed to the os frontis, so as to facilitate the ascent of the face. Care should be taken to keep the bandage always parallel to the cervico-bregmatic diameter; for, if it be drawn too much forward toward the face, it would have no effect in bringing down the occiput;

and if drawn too far backward toward the occiput, it would slip from the head. Hence, the traction must be made more and more downward as the occiput descends.

We can perceive no possible objection to this operation; it promises to be safe to the tissues of the mother and those of the child, and probably far more efficient than the lever in these facial presentations.

The only real practical difficulty is the transmission of this bandage over the sub-occipital region of the head. This may be accomplished in the manner already intimated, when treating of the occipito-posterior positions of the vertex. The fillet may be stiffened by a delicate piece of whalebone, or other elastic substance, so that it can be pushed between the head of the child and the pelvis, over the occipital protuberance, or it can be passed more directly around the head by means of a large size Bellocq's canula spring. (Fig. 39, on page 233.)

It would be best, as being more convenient, to fix the fillet in its proper position, before the head be changed from its direct to its oblique position in the cavity of the pelvis.

This operation of version by the vertex is, of course, applicable to those cases where the head has been arrested in its oblique position, and where rotation, either anteriorly or posteriorly, could not occur.

If, unfortunately, all these measures should be impracticable, and especially if it can be positively ascertained that the foetus is no longer living, the operation of *craniotomy* is a final resource, imperiously demanded for the safety of the mother. There will be no difficulty, in such cases, of opening the head, and breaking down the brain, and the processes of the dura mater. Perhaps it may be well to suggest, that even then direct force by crotchets or craniotomy forceps should not be applied. It would be better, we think, by means of the craniotomy scissors, to divide the tissues of the cranium, from the top toward the base of the head, on either side, as far as practicable; this being accomplished, and a lever applied over the side of the head and the occipital protuberance, a little pressure would diminish the occipito-frontal diameter, and cause the occiput to descend under the arch of the pubis. Delivery, however, by any of the usual means, can be accomplished without great difficulty, the integrity of the cranium being destroyed.

In the treatment of the *second position* of a face presentation, the same principles should guide our practice in the various emergencies which may occur. The only difference is, that rotation should take place in the opposite direction to that in the first position. Thus, if the head has descended into the cavity of the

pelvis, the first object of the practitioner will be to press now on its *left* side, so as gradually to convert the second into the fourth position.

If, however, this cannot be effected, the same efforts to produce flexion in the cavity of the pelvis should be attempted as in the former case; and when rotation has occurred into the hollow of the sacrum, the treatment is precisely similar.

In the treatment of the *third position* of the face, if seen early, version by the vertex should always be attempted. If, however, the face has passed the verge of the os uteri, pressure upon the side of the head should be made as soon as practicable, in order to change this third into a first or second position. Should the practitioner not be present until the face has descended to the floor of the pelvis, the case becomes much more serious than even an original first or second position; inasmuch as the shoulders will be transverse at the superior strait, and there will probably be more danger, as well as difficulty, in determining the chin from the posterior to the anterior part of the pelvis. Nevertheless, this operation should be attempted in a very gradual manner at all hazards, because it promises far more than any attempt to deliver by the forceps, and as far as the practical experience of the profession has yet advanced, it will probably be more feasible than version by the vertex in the cavity of the pelvis.

Theoretically, however, the author is inclined to the belief that the child will be safer by first causing a slight rotation of the head, and then by means of the fillet producing flexion of the head in the pelvis, as has been already indicated.

We have dwelt the longer on the treatment of the *occipito-anterior* or *mento-sacral positions* of the face, as, although comparatively very rare, they are generally fatal to the child and very dangerous to the mother, demanding, therefore, all the resources that science and art can render in these terrible cases.

In *occipito-posterior* or *mento-pubic positions*, which would include all those cases where the chin primarily or secondarily plays upon the anterior inclined planes of the pelvis, and are usually treated under the denomination of left or right mento-iliac positions, the practitioner generally has simply to co-operate with nature in her mode of effecting delivery. If the patient be early seen, in the *fourth position* of the face, while the presenting part is still within the verge of the os uteri, it would be best, for reasons already mentioned, immediately to resort, by means of the left hand, to version by the vertex. If, however, the head has descended through the os uteri, all the practitioner has to do is to watch the process narrowly, and if there be any delay

in the rotation of the chin toward the pubis, to facilitate this desirable motion by the *finger* placed over the left side of the head of the child below the parietal protuberance, and pressing the top of the head from right to left posteriorly toward the sacrum; or, sometimes, if the chin is near the pubis, the finger can be passed over the face of the child to the right malar bone, and thus hook the chin forward from left to right under the arch of the pubis. This is an operation so easily performed, and the natural tendency is so great, that if any bearing-down efforts continue, hardly any difficulty will be experienced. Should, however, the pains be entirely suspended, and the finger be not sufficiently powerful, the *lever* or the left or male blade of the forceps might be applied upon the sacral side of the face and temple, so as to accomplish this rotation in whole or in part. In some instances the *forceps* may be demanded when the head is still oblique in the pelvis; in this case the left or male blade goes over the right or sacral side of the head, and the left or female over the left or pubic side, and should correspond, as nearly as possible, and to the occipito-frontal diameter of the head, not to the occipito-mental as in vertex presentations. (Plate XXVII., Fig. 135.) The head being oblique, the handles of the forceps will now be directed somewhat toward the left thigh of the mother, and the blades in the direction of the axis of the superior strait of the pelvis, and under their influence as the head is made to descend, the face will press more and more firmly against the perineum, and the chin will be found rotating forward over the ramus of the ischium. As flexion then rapidly occurs, the handles of the forceps should be allowed to rise in a proportionate degree toward the pubis. (Plate XXVII., Fig. 136.) When the head passes the vulva, the handles of the forceps will be at right angles with the abdomen of the mother; or if there be much rigidity of the os vaginæ, they will incline over the abdomen at the moment of the exit of the head from the vagina. Care should be taken at this juncture that the extremities of the forceps, which sometimes project beyond the occiput of the child, do not injure the posterior wall of the vagina or perineum.

If, however, the practitioner be not called until *rotation has occurred*, and the face has reached the perineum, and the bearing-down efforts are still active, his chief duty will be to protect the perineum.

For this purpose the palm of the hand should be firmly pressed upon the perineum, the fingers extending toward the coccyx. The pressure thus made can be altered in proportion as the forehead descends along the posterior wall of the vagina, and thus be very effectual in preventing any lesion of the tissues.

By judicious pressure, made in the manner indicated,

another important indication may be fulfilled, viz., to *facilitate the flexion of the head*. This will be very efficient as soon as the forehead has passed the os coccygis; for the fingers can then be easily directed upon the posterior perineum against the apex of the forehead so as to determine it more readily downward and forward toward the vulva, rapidly augmenting the ascent of the chin in front of the pubis.

When the forehead has approximated the anterior perineum, still more efficient assistance can often be rendered by passing one or two fingers through the dilated anus into the rectum, so as to make pressure upon the posterior part of the head of the child. Pressure thus made will be very influential in facilitating flexion and preventing injury to the mother's tissues.

The author feels persuaded that even when the bearing-down efforts of the mother are feeble, delivery may often be effected by the educated accoucheur, simply by these manual efforts, properly directed, so that the forceps or vectis will not be demanded.

Still there are cases where nature is entirely inadequate to delivery, or where circumstances demand that this process should be speedily accomplished. There can be no objection to the application of the *forceps* in all such instances,—they should be applied parallel to the occipito-frontal diameter, (Plate XXVII., Fig. 136,) which now corresponds to the axis of the pelvis and vagina, so that delivery can be readily accomplished in perfect subserviency to the natural mode, as already detailed.

If, however, the forceps be not at hand, this is a case in which the *lever* can be very effectually used as a substitute, although inferior in power and safety. The lever should be directed over the parietal protuberance to the base of the occiput, which can then be powerfully drawn downward along the plane of the perineum, thus facilitating flexion and the descent of the head of the child.

If no lever be at hand, the practitioner has, in a *fillet*, passed over the head and occiput of the child—by means of a delicate piece of whalebone or spring

Fig. 65.



Face Presentation. Chin anterior at the Inferior Strait. Vectis applied.

canula, as formerly explained—a powerful instrument to bring down the occiput, and thus simultaneously producing flexion and descent of the head. The direction of the tractile force, when the fillet is employed, should correspond to that of the cervico-bregmatic diameter, and therefore should be altered in proportion as flexion increases. The hand of the operator being

gradually elevated more and more toward the pubis, so as to cause the descent of the occiput, and thus the flexion of the head, until delivery be completed.

We have frequently asserted that under this fourth position of the face should be included all those cases where the chin corresponds to the anterior inclined plane of the pelvis, and in consequence, as has already

been shown, many in which the chin points toward the posterior part of the plane of the ischium. The treatment therefore of all the *transverse positions* of the face are precisely the same as those of the fourth or fifth position. In all, the main indication is to produce rotation of the chin toward the pubis, if possible, by the finger, where such rotation does not occur spontaneously; or, if this fail, then by the vectis. The author, however, cannot believe that the use of the forceps can be justified, except in some very extraordinary cases, until the chin has advanced at least to the foramen thyroideum. Prior to this their application will be difficult and dangerous, necessitating, when the head is transverse, the application of one blade to the pubis and the other to the sacrum, and thus endangering the bladder, urethra, rectum, etc.

If, unfortunately, owing to any peculiar circumstances there is a disproportion between the size of the head and the pelvis, or failure of bearing-down efforts, etc., and the forceps be not adequate for delivery, craniotomy may occasionally be demanded. In such cases the cranium may be perforated on the left or pubic side of the head; then with craniotomy scissors, the os frontis or os parietalis may be divided in different directions so as to destroy its integrity. Subsequent delivery is accomplished most easily and safely by means of the forceps, which will be then used in the first place as compressors to diminish the size of the head, and afterward as tractors and levers, in the usual manner. If no forceps be at hand, the small blunt or sharp hook will be superior to any other instrument as a tractor; for it can be introduced readily into the mouth, and the point turned toward the roof and fixed on the posterior nares, where it will find a firm support, after crushing the palatine bones, on the superior maxillary bone. Traction here made, also, would be most efficient as acting in the direction of the occipito-frontal diameter, or the one corresponding to the axis of the pelvis. The objection to planting the hook, as often recommended, on the inferior maxillary bone, is that neither the symphysis menti nor the surrounding tissues would sustain much traction effort. If from any cause the head cannot be punctured through any portion of the vault of the cranium, an opening may be made through the orbit of the eye, so as to destroy the orbital processes of the os frontis; but this can be seldom required.

The treatment of the *fifth position* of a nasal or facial presentation is precisely similar to the former, with the exception, that as rotation naturally occurs on the right anterior inclined plane toward the pubis, it becomes the business of the practitioner, when assistance is requisite, to facilitate such rotation by

pressure now upon the *right* side of the cranium, so that the chin may come under the arch of the pubis, and the top of the head toward the sacrum. Of course, also, in all instrumental operations, the importance in these fifth positions, of the rotation of the chin from the right to the left anteriorly, should be constantly remembered.

In the treatment of the *sixth position* of a nasal or facial presentation, at the commencement of labor, it will be desirable, as usual, to convert this into a vertex presentation; and, if this be not practicable, labor, perhaps, may be somewhat facilitated by pressing the chin to the right or the left of the symphysis pubis, so as to give the head a slight oblique position. But this is not absolutely requisite, inasmuch as the fronto-mental diameter of the face is short, it may pass readily through the superior strait some distance before the neck is engaged, and the base of the jaw and the point of the neck readily subtend the depth of the pubis anteriorly, allowing the head to descend, and to flex, as formerly explained. Still, however, there may be delay at the superior strait, in consequence of the short diameter of this strait being involved; in which case the os uteri being sufficiently dilated, the forceps could easily be applied, and be very efficient in bringing down the head into the cavity of the pelvis. The traction effort, however, should be carefully made directly downward in the direction of the axis of the superior strait of the pelvis, until the chin has descended below the arch of the pubis, so that flexion can readily ensue. The practitioner, by suspending his efforts during the absence of a pain, can readily determine whether the chin is disposed to rise and approximate the pubis, when, of course, the direction of the traction effort should be altered according to the degree of the flexion of the head.

In extreme cases of difficulty, craniotomy may here also be occasionally demanded.

PRESENTATIONS OF THE SIDES OF THE HEAD.

These are frequently called presentations of the *ear*, or of the os parietalis.

In these cases there is a lateral flexure of the neck, so as to allow the child's head to take an oblique position to its right or left side. Hence, portions of the parietal or temporal bone shall be found toward the centre of the pelvis; and we have, therefore, a presentation of the right or left side of the head; or the right or left os temporis. The degree of this lateral inclination of the head, or the exactness of this presentation must, of course, vary.

The *diagnosis* cannot generally be very difficult,

especially after the membranes are ruptured. The ear of the child may be recognized, not far from the centre of the superior strait, and the side of the face will be found toward the side of the pelvis.

The *causes* of this unnatural presentation are obscure; the supposition may be made that, in some cases of *obliquity* of the uterus, when the membranes rupture, and the child's head is, at the time, in a state of partial extension, the top, or *sinciput*, might be pressing upon the anterior or posterior portion of the brim of the pelvis; while the contractions of the uterus, operating through the medium of the spine, may prematurely depress the base. Hence, lateral inclination is given to the head, and the contractions continuing, the neck will be forced more and more into the pelvis, and the top of the head be necessarily arrested at the brim of the pelvis. Whatever explanation, however, may be adopted, such cases are occasionally, though very seldom, met with in practice. Owing to the length of the child's head, it would seem impossible that the chin should ever be directed toward the spine or symphysis of the pubis, and, therefore, we may safely assume that there can be, for practical purposes, only two positions of this presentation, according as the occiput is to the right or left side of the pelvis.

LEFT OCCIPITO-ILIAC POSITION OF THE RIGHT EAR.

—In this *first position* the occiput is toward the left side of the pelvis, and might be, therefore, called the *left occipito-iliac position*, although the occiput may sometimes be found anteriorly over the ramus of the pubis, or posteriorly toward the sacro-iliac symphysis. (Plate XXVIII., Fig. 137.) It is evident, in these cases, that the longest diameter of the head (the occipito-mental) corresponds to the long diameters of the superior strait, sometimes, for example, to the left or right oblique, and sometimes to the transverse; while the cervico-bregmatic or trachelo-bregmatic diameter, in this case, as it were, prolonged by the projection of the neck into the pelvis, intervene between the sacrum and the pubis; and the bi-parietal diameter corresponds to the direction of the axis of the superior strait of the pelvis. (Plate IV., Figs. 37 and 38.)

It is manifest, therefore, that if this presentation be *persistent*, it becomes at once a case of impracticable labor; inasmuch as the long diameter of the head, measuring five inches, would correspond to the oblique of the superior strait, and the trachelo or cervico-bregmatic diameter, augmented by the presence of the neck, could not pass between the pubis and the sacrum. In many instances, also, powerful contractions of the uterus, acting through the medium of the neck, would even fix this mal-presentation more firmly,

when, from any cause, the top of the head is arrested at the posterior portion of the brim.

Nevertheless, such cases are seldom persistent; the neck and right shoulder of the child, in this first position, may be retained by the anterior circumference of the pelvis; while the convex surface of the top of the head, acting upon the promontory of the sacrum, under the influence of powerful contractions of the uterus, not unfrequently glides from this projection downward into the pelvis. The lateral flexure of the neck thus disappears, and it will be found, on a vaginal examination, that the ear and parietal protuberance have disappeared, and the top of the head—as represented by the anterior or posterior fontanel—may now be detected toward the centre of the pelvis; in other words, it is a spontaneous change from a presentation of the right side of the head in this position to that of the left occipito-position of the *sinciput* or occiput, to be treated accordingly.

RIGHT OCCIPITO-ILIAC POSITION OF THE RIGHT EAR.

—This *second position* is where the occiput is toward the right side of the pelvis, either to its anterior or posterior portion. (Plate XXVIII., Fig. 138.) It may be termed the *right occipito-iliac position* of the presentation of the right side of the head. On examination per vaginam, the ear of the child or the parietal protuberance may still be found toward the centre of the pelvis, yet the side of the face will be now recognized toward the left; while the anterior fontanel will be anterior, and the base of the cranium will be posterior. Of course, therefore, the same diameters are concerned as in the former position, the chief difference being that the occipital extremity of the occipito-mental diameter is to the right instead of to the left side.

As in the other case, the presentation sometimes remains *persistent*; but, in most instances, spontaneous conversion into a presentation of the anterior or posterior fontanel may ensue, owing to the retention of the right shoulder and neck at the posterior segment of the superior strait, so as to allow the top of the head to glide from the body or ramus of the pubis, into the cavity of the pelvis.

LEFT OCCIPITO-ILIAC POSITION OF THE LEFT EAR.—

This *first position* is where the occiput is toward the left side of the pelvis, and the face toward the right side—the *left occipito-iliac position* of the left side of the head, (Plate XXVIII., Fig. 139,) the left ear and left parietal protuberance will be recognized toward the centre of the pelvis, and the face toward the right side, while the top of the head will be pubic, and the base of the head sacral. The same diameters of the head

are concerned as in the first position of the right side, except that the cervical extremity of the cervico-bregmatic diameter is posterior, and the bregmatic extre-

Fig. 66.



Presentation of the Left Ear.

mity anterior, the reverse of what occurred in the first position of the right side. Hence, it follows, that in those cases where spontaneous conversion occurs, it will be owing to the resistance of the left shoulder posteriorly, and the descent of the sinciput anteriorly into the cavity of the pelvis.

RIGHT OCCIPITO-ILIAC POSITION OF THE LEFT EAR.—The occiput in the *second position* of the left side of the head will be found toward the right linea ilio-pectinea and the chin toward the left linea ilio-pectinea. (Plate XXVIII., Fig. 140.) When spontaneous conversion occurs in this case, the left shoulder will be retained by the body or ramus of the pubis, while the top of the head will glide off from the promontory of the sacrum, so that a conversion will be made into the right occipito-iliac position of the anterior or posterior fontanel.

Treatment of Presentations of the Right Ear.—It is evident that there can be but one general plan of treatment suited to the two positions of the right ear just mentioned; and the interesting question ought, *a priori*, to be decided, whether all such cases should be left to the probabilities of a spontaneous delivery, or

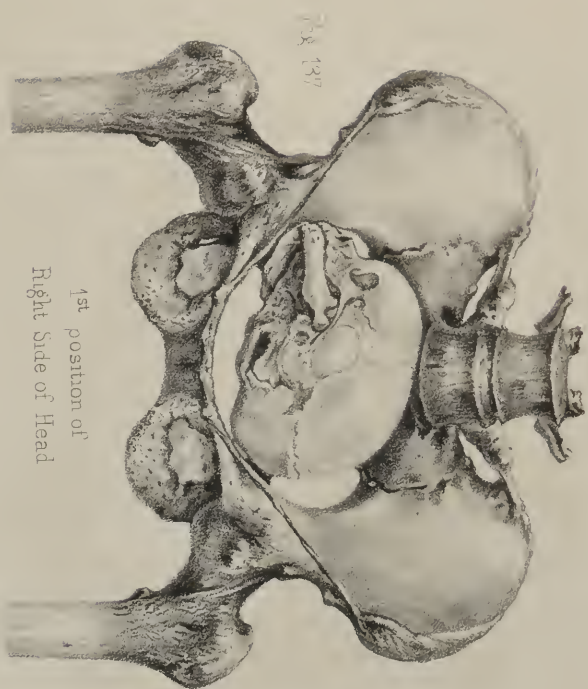
whether, knowing the fact that in some instances no favorable change occurs, and the labor therefore becomes impracticable, it is not the imperative duty of the practitioner to alter the presentation as soon as possible. In view of the circumstances of the case, it seems to the author singular that very universally the best authorities, Baudelocque, Madame Lachapelle, P. Dubois, Cazeaux, Chailly, etc. etc., recommend that such cases should be left to nature, considering them as simple deviations of vertex presentations, which will be rectified by the contractions of the uterus. They, therefore, advise patience, and that no interference should be offered even for hours, until it is manifest that no change is likely to occur. They thus disregard the increased pain and suffering to which the mother is necessarily subjected, and the possible death of the infant from impaction, and the consequent injury which may be sustained by the tissues of the parent, even if her life may not be forfeited.

This is the more surprising as the operation for altering the presentation can generally be easily accomplished, if early performed, with no danger to the child, and with comparatively little pain or danger to the mother.

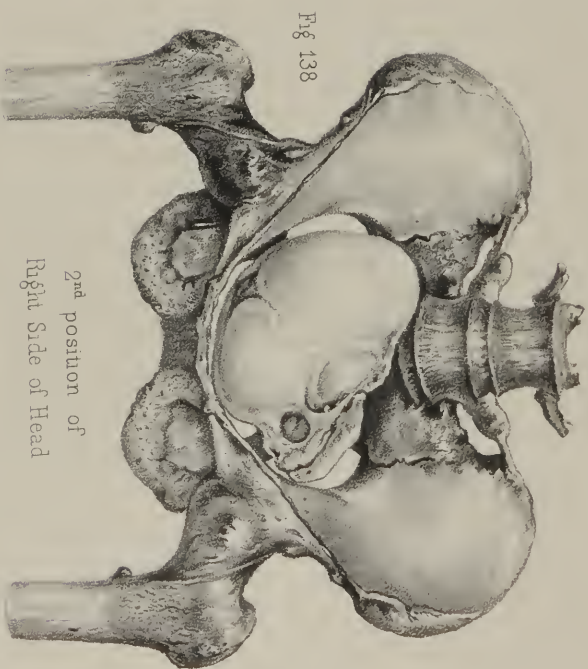
When the os uteri, therefore, is found dilated, and there is a presentation of the *right side of the head* in the *first, or left occipito-iliac position*, the uterus not being powerfully contracted, it will be sufficient for the practitioner to pass one or two fingers against the right side of the neck, near the pubis, and push it well upward during the absence of a pain, and retain it there, as far as practicable, until the bearing-down effort takes place; this effort will then be directed upon the left side of the child's head, which will, of course, facilitate, not only the descent of the head, but a lateral flexure, the neck being retained toward the right shoulder; that is, the top of the head may thus glide upon the posterior part of the brim downward into the cavity—this lateral flexure being made on the fingers of the practitioner, as upon a fulcrum or prop.

If this should not be effectual, the same lateral flexure might be accomplished by means of the lever, passed in the direction of the cervico-bregmatic diameter over the top of the child's head, so that, by its traction effort, the sinciput may be drawn down, while the neck, or base of the cranium, is supported by the fingers of the practitioner.

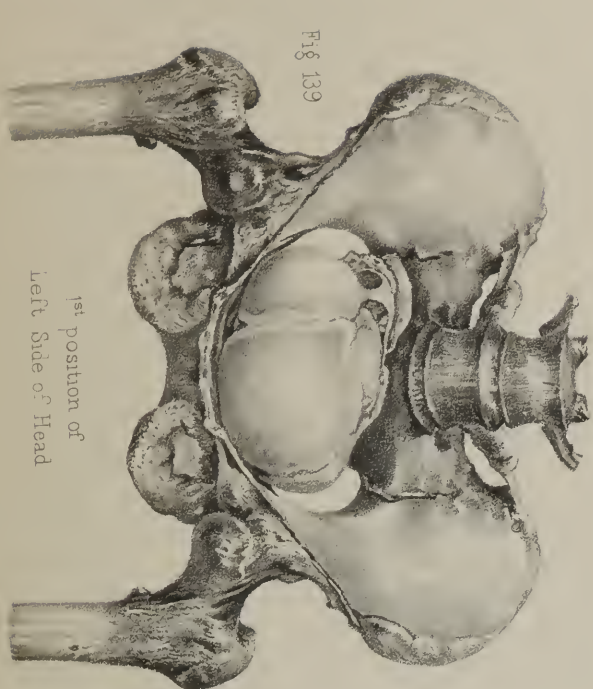
Perhaps, in most cases, it will be found more practicable, especially in multiparous patients, although more painful to the mother, at once to introduce the hand, and, in this case, the right hand, into the pelvis, and resort to version by the vertex, *secundum artem*.



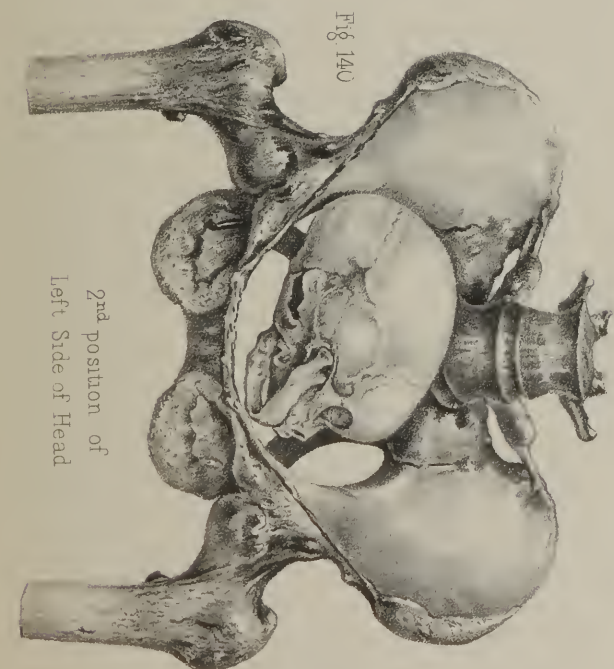
1st position of
Right Side of Head



2nd position of
Right Side of Head



1st position of
Left Side of Head



2nd position of
Left Side of Head

If labor, however, has existed for some time, and the head be *impacted* in the superior strait, the case becomes very serious, at least to the child, if not to the parent. Authors generally recommend that version by the vertex should be attempted; but all acknowledge the great difficulty, if not impossibility, of performing the operation under these circumstances—even such adroit accoucheurs as Baudelocque, Madame Lachapelle, P. Dubois, etc., deem it very difficult, if not impossible. It may, however, receive a judicious trial. Some efforts, also, might be made to bring down the sinciput, by means of the lever; but generally it will be found that perforation of the head will be imperatively demanded for the safety of the mother.

Many years ago, the author was called in consultation to the case of a young girl in her first labor, who had been under the care of a midwife. Believing that "all was right," that more pain only was wanting for delivery, she exhibited the ergot freely. Powerful contractions were thus induced and kept up for some days, and, on the fifth day, the powers of the uterus were completely exhausted; physicians were sent for, who, finding the patient still in a good condition, again ventured on the exhibition of the ergot, with no effect. The author being now summoned, found the patient still with a good pulse, and not greatly prostrated. The superior strait of the pelvis was completely occupied by the head of the child; but an accurate diagnosis could not be made, owing to bloody tumors and infiltrations in the presenting part. The blades of the forceps were carefully passed on the sides of the pelvis to the superior strait, and, without difficulty, a firm grasp was made upon the child's head, which, however, was found perfectly immovable. Craniotomy being now determined on, the head was punctured. The forceps, which had not been removed, were now used as compressors, their handles being approximated, by means of a strong fillet; the head yielded to this compression, and gradually was brought down, and delivered externally. It was now found that it had been an original presentation of the right side of the head in the first position, and that one blade of the forceps was over the face, and the other over the occiput; so that the long diameters of the head had been, by means of the forceps, so diminished, as to allow the transit of the head through the outlets of the pelvis, with the face toward one ischium, and the occiput toward the opposite. The patient recovered without any special difficulty.

In the treatment of the *second*, or *left occipito-iliac position*, the same practice is required, but the pressure with the fingers against the neck must now be made at the posterior part of the pelvis, and must,

therefore, be less efficient, owing to the great depth to which the hand must be carried; while, for the same reason, the application of the lever over the top of the head anteriorly will be more readily accomplished, and be more efficient, owing to the slight depth of the anterior portion of the pelvis.

The treatment of the *first* and *second positions* of the *left side* of the *head* must be conducted in the same manner as the former, always bearing in mind, whether the top of the head be pubic or sacral, and, of course, attending to the direction in which the lateral flexure of the head should be facilitated.

In all these positions of the side of the head, where it is determined to resort to version by the vertex, the practitioner should be careful to employ the *right hand* in the left occipito-iliac positions, and the *left* in the right occipito-iliac positions.

COMPLICATIONS OF PELVIC PRESENTATIONS.

PRESENTATIONS OF THE BREECH.—As already detailed, it is important to remember that nature is fully adequate to delivery in a large majority of presentations of the coccygeal extremity of the foetal ellipse; moreover, that injudicious or unscientific interference is far more detrimental, in such cases, than in vertex presentations. Nevertheless, the necessity for affording assistance, in many instances, cannot be denied, and, in some, positive interference is absolutely requisite for the safety of the mother, as well as the child.

Too much attention, therefore, cannot be paid in studying the mechanism of labor, that all such assistance and interference may be positively useful and not injurious. If, therefore, from the large size of the child, or from the deficiency of expulsive power, assistance is required in cases where the presentation of the breech and the position of the child is perfectly favorable, the important indication is simply to *facilitate* the natural modes of delivery.

In the *first* or *left sacro-anterior position* of the breech, therefore, we are to wait patiently until the os uteri be fully dilated and the membranes ruptured; and then encourage, as much as possible, the bearing-down efforts of the mother. Should these be very deficient, and the breech still within the circle of the os uteri, and immediate delivery, from any complication, be very desirable, the operation of *version by the feet* may be resorted to, as this gives the practitioner much more command of the body of the child than he can obtain by any other procedure. It should, however, we think, be reserved for extreme cases; inasmuch as the dangers to the child from pressure upon

the umbilical cord, etc., are greatly enhanced. If such speedy delivery is not demanded for the safety of the mother, and in all cases where the breech is past the circle of the os uteri, version should not be attempted. *Traction* may be artificially resorted to, first by the finger introduced into the left or pubic groin, by which some assistance can be rendered in causing the descent of the pelvis in the direction of the superior strait. If this be not sufficient, the fillet or the blunt hook may be applied to the same groin, according to rules already detailed, to facilitate the descent. By them any required force may be applied; but this force should be as moderate as possible, and intermitted during the absence of a pain, so as to avoid injuring the tissues of the groin, which are necessarily much endangered.

As the hips descend, *rotation* will almost necessarily

occur; if, however, the pelvis remains oblique, this important process can be facilitated by the finger, which may be passed over the spinous processes of the sacrum, as far as practicable, toward the right hip of the child, which should then be pressed backward from left to right toward the hollow of the sacrum; or the finger may be placed in the left groin, by which the left hip may be inclined toward the pubis. The pelvis of the child, by the continuation of the traction effort, may thus be delivered through the inferior strait, vagina, and the vulva; after which the unfolding of the limbs and the restitution of the hips will immediately ensue.

All traction effort should be immediately suspended as soon as the breech passes the os vaginae, until the practitioner has ascertained whether the arms have descended in a natural manner with the thorax of the

Fig. 67.



Breech Presentation—(Second Position.) Delivery of the Sacral Arm.

child. If they have not, then they are to be brought down (the right or sacral arm first) into the cavity of the pelvis, and be delivered externally by means of the fingers, according to rules already given. (Page 227.)

In those cases, however, where the hand or finger is not sufficient, and when the child has already perished, the blunt hook may be very advantageously employed as a substitute for the finger. In this first position, there-

fore, the flat surface of the hook should be passed along the back of the child with the point directed toward the right side, until it reaches the top of the shoulder, when, under the guidance of the index finger, and by twisting the instrument, the point can be passed over the shoulder and along the humerus as far as practicable. Traction effort may now be made, and, at the same time, the arm is to be pressed toward the breast

of the child, when it can be brought down, generally without any injury to the tissues. If, however, the arm be firmly fixed and the child be dead, a strong traction effort may be made by means of the hook, so that the shoulder, movable as it is upon the thorax, can thus be made to descend, and the arm can be retracted along the side of the body.

A similar operation, by means of the finger or hook, can now be directed toward the pubic or left shoulder, the body being previously pressed backward and laterally toward the tuber of the left ischium.

The bearing-down efforts of the mother should now be encouraged as much as possible, so as to facilitate the descent of the chin toward the sternum—that is, to increase flexion, traction effort being for the moment suspended, while the body of the child should be carried as near as practicable toward the symphysis pubis. Sometimes it may be useful to pass a finger along the spinous processes of the dorsal vertebræ, to press the right scapula or shoulder backward, so as to facilitate the rotation of the shoulders, or to hook the left shoulder from right to left toward the pubis. This rotation of the shoulders almost universally, under these circumstances, occurs so readily that no assistance is required.

If the head does not immediately descend through the superior strait and os uteri, the practitioner should pass two fingers of the left hand to the superior maxillary bone, one on each side of the nose to preserve or increase flexion, while the body of the child is carried close to the pubis; then, and not till then, traction effort may be made by drawing the body of the child upward. In this way the chin of the child will present to the centre of the pelvis, and delivery can usually be effected. This flexion can, if necessary, be still further facilitated by committing the body of the child to an assistant, while the practitioner carries the index finger of the right hand behind the symphysis pubis, so as to press the occiput backward and downward toward the sacrum. By operating in this way upon both extremities of the head, the chin will be determined downward more and more toward the breast of the child.

When speaking of natural delivery, we dwelt upon the great importance, even in such cases, of carrying the body of the child directly upward, the patient being supine, so that the back of the child should be brought parallel to the symphysis pubis, which manœuvre greatly *facilitates* the approximation of the chin to the centre of the pelvis.

In artificial delivery this manœuvre is almost essential; but it is also important to make traction effort upon the body of the child directly upward, at right

angles to the abdomen of the mother; for traction effort in this direction facilitates flexion, inasmuch as the occiput is retained by the pubis, and the whole force applied determines the descent of the chin and its approximation more and more to the breast of the child, the head being used as a lever of the third kind. This is the essential agency; it is, of course, to be greatly assisted by the bearing-down efforts the mother may exert, and also by the fingers of the practitioner applied to the upper maxillary bone. We see no necessity, as Madame Lachapelle and M. Chailly recommend, to introduce the whole hand over the face of the child, and certainly object to the advice, so commonly given by authors, to place one or more fingers in the mouth to produce flexion. This will be very inefficient, as the lower jaw is movable, and there will be great danger of its dislocation or of rupture of the symphysis menti, etc.

If, unfortunately, after flexion has been produced, the head, from any cause, should not descend under the traction effort, which has thus been made, additional assistance may be safely rendered by the forceps, which can then be applied parallel to the occipito-mental diameter of the head,—the chin, in this case, pointing toward the lock of the forceps. The concave edges of the blades will be toward the base and the convex edges toward the summit of the head. Care should be taken, in these cases, to carry the blades of the forceps backward, close to the perineum; great power can thus be exercised in causing the descent of the head through the superior strait and the cavity of the pelvis. Such assistance, however, is very rarely demanded, owing to the size of the superior strait, provided flexion be properly established, and traction effort by the hand be scientifically and judiciously made.

It is said by some authors, (M. Chailly, for example,) that in such cases, where the head is at the superior strait, that it is impracticable to apply the forceps, unless the child be detruncated; but we must believe that *if flexion* of the head be previously induced so as to get the chin of the child toward the centre of the pelvis, that there will be no real difficulty in their application.

Nevertheless, no time should be lost, for it is impossible for the life of the child to continue safe under these circumstances, as the functions of the cord and placenta are, by this time, generally suspended.

It often happens, in these pelvic deliveries, that from the want of bearing-down effort, from the injudicious traction upon the body of the child, or even from the necessary operation of bringing down the arms, there has been a premature descent of the occi-

pital extremity of the head, or, as it is usually expressed, a departure of the chin from the breast; in other words, that extension, more or less complete, of the head, has occurred at the superior strait of the pelvis or at the os uteri. On examination per vaginam, the chin, instead of being at the centre of the pelvis, will be found at the right sacro-sciatic foramen, or even higher up toward the sacro-iliac symphysis; in the first instance, the forehead of the child will be at the right sacro-iliac symphysis and the occipital protuberance toward the left acetabulum. (Plate XXX., Fig. 145.) This will be therefore, virtually a *presentation of the base of the cranium*, the occipito-frontal diameter corresponding to the left oblique, the bi-parietal to the right oblique, and the trachelo-bregmatic diameter to the axis of the superior strait of the pelvis; in other words, the child presents its horizontal or occipito-frontal circumference or plane, parallel to that of the superior strait of the pelvis, precisely as in presentations of the sinciput or anterior fontanel. (Plate IV., Fig. 29; Plate II., Fig. 8.)

If the chin has departed still further from the breast, so as to be found toward the linea ilia, there will be a presentation of the base of the whole head, (Plate IV., Figs. 30 and 32,) the occipito-mental diameter, in this case, corresponding to the left oblique, the bi-parietal still to the right oblique, the cervico-bregmatic diameter to the axis of the superior strait. (Plate XXX., Fig. 146.)

In this case, therefore, there will be an arrest of the head, unless some change should occur in the presentation, which is never to be expected; in the former case, also, when the base of the cranium, and, therefore, the occipito-frontal diameter are merely concerned, the head also is generally arrested, owing to the contraction of the neck of the uterus. If, however, this be much relaxed, the head may descend in this presentation into the cavity of the pelvis, before it is arrested.

The treatment, therefore, in these cases, is to be conducted upon the same principles. We should assiduously strive to bring the chin downward to the breast, that is, to increase flexion, by means of the *fingers*, acting upon the occiput posteriorly, so as to cause its ascent, and upon the face anteriorly, so as to cause its descent, which can generally be accomplished. Should, however, the practitioner unfortunately fail, and the child still be alive, an attempt may be made, by means of the *lever*, which may be passed over the right or sacral side of the face and temple, (Plate XXX., Fig. 149,) to bring down the os frontis, and thus cause the descent of the chin into the cavity of the pelvis; while the occiput may, at the same time,

be elevated by the pressure of the finger against its base. Care, of course, should be taken that the lever does not injure the features of the child, or that its point is not pressed against the anterior fontanel, or into the bi-frontal commissure.

If, by these means, flexion cannot be produced, the *forceps* have been suggested by many authors, as useful to effect the descent of the head; but they are not applicable to these cases, for several reasons: in the first place, they will have to be applied, as in cases of presentation of the sinciput, in the direction of the trachelo-bregmatic diameter of the head, so that the points of the instrument will project beyond the top of the cranium, injuriously, it may be, to the tissues of the mother. Second, moreover, traction effort, under these circumstances, will have but little tendency to alter the presentation, but the head will be drawn down, if it could be moved in any degree, presenting its long diameters. Third, the application of the forceps is almost impracticable in such cases, owing to the resistance of the perineum, preventing the handles of the forceps from being carried sufficiently far back, even to bring the blades parallel with the trachelo-bregmatic diameter. Hence, especially when the base of the whole head presents, the blades of the forceps will be in the direction of the trachelo-frontal diameter, in which case the cephalic or concave surface of the blades will not accurately apply to the convexities of the head. The edges of the forceps might then cut the scalp, or even the bones; and there will be great tendency in the forceps to slip along the sides of the head, endangering the tissues of the scalp, and also the tissues of the mother.

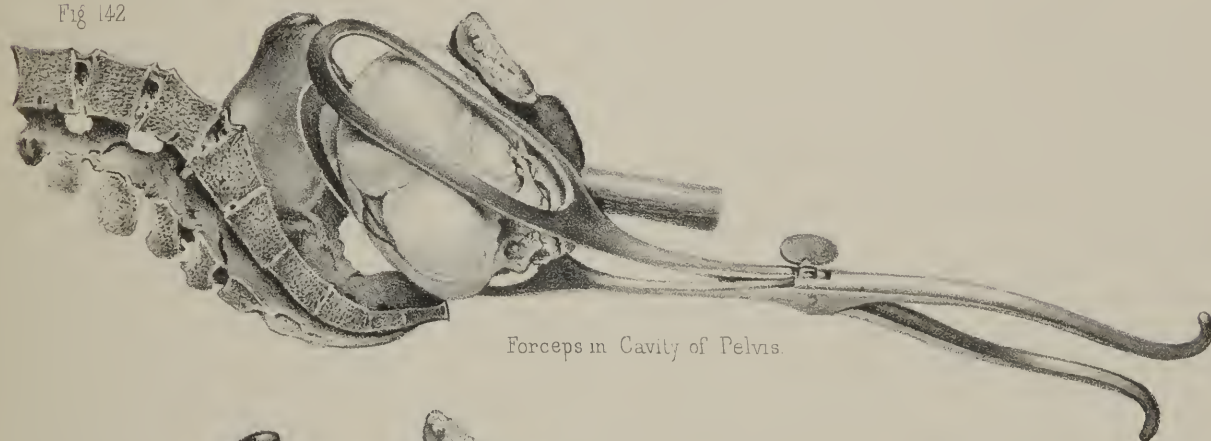
Some thirty years ago, the author was called to the assistance of a young practitioner in a case where the head was arrested by its occipito-frontal diameter, in the direction of the oblique diameter of the superior strait. The child had been long dead, and the mother was now much exhausted. All the usual attempts by manual delivery having failed, the forceps were several times introduced, but could not be advantageously applied. After some reflection, as to a suitable method of bringing down the face of the child, the author determined to pass a *small blunt hook*, guided by the fingers, toward the right sacro-iliac symphysis, and over the face of the child, so as eventually to rotate the point of the hook upon the edge of the orbit of the eye. (Plate XXXI., Fig. 150.) Traction was now made, by which, without much effort, flexion was produced, and, of course, the cervico-bregmatic diameter was substituted for the occipito-frontal, and the head readily glided through the superior strait into the cavity of the pelvis. All difficulty was thus removed,

Fig 141



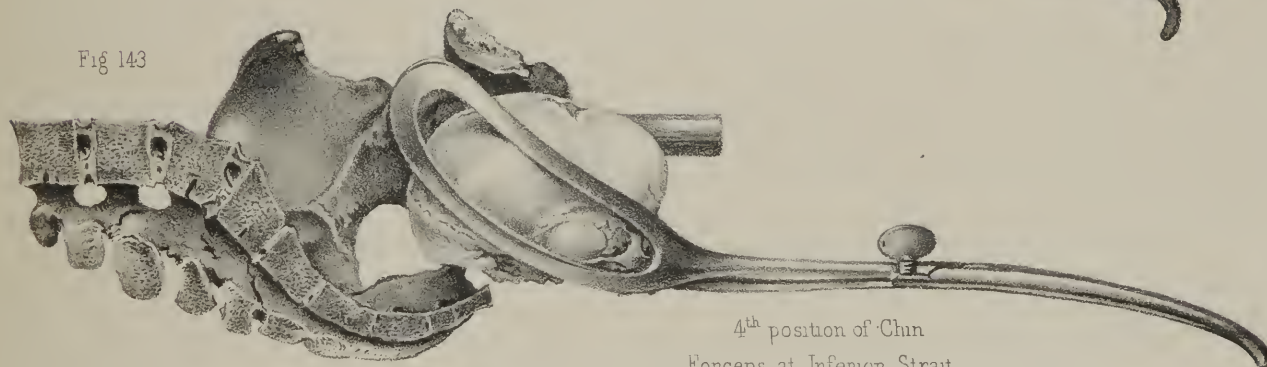
1st position of Chin
Forceps at Inferior Strait

Fig 142



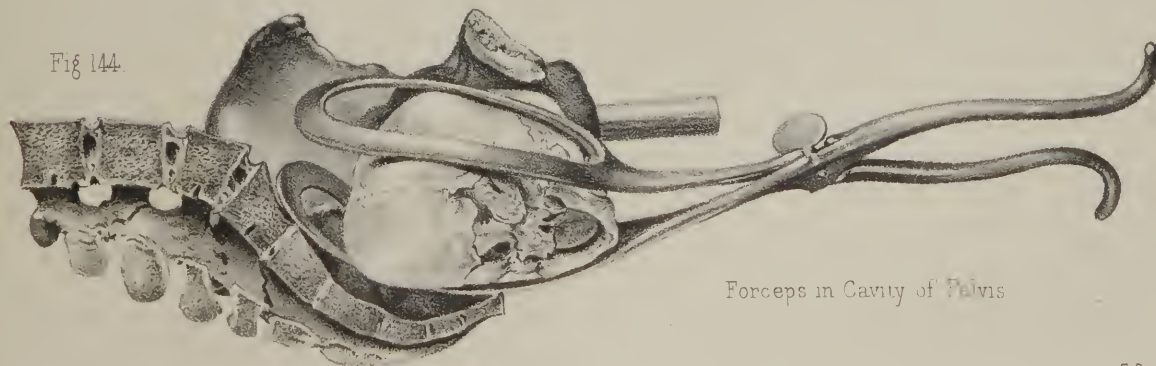
Forceps in Cavity of Pelvis.

Fig 143



4th position of Chin
Forceps at Inferior Strait

Fig 144



Forceps in Cavity of Pelvis

and the patient speedily recovered. Upon examination, there was no laceration of the tissues at the edge of the orbit, manifesting that a slight force is sufficient to effect this important change, in ordinary cases. It is probable, therefore, that such an operation might be safely performed upon a living child, where all efforts to produce flexion by the fingers had entirely failed, especially as the life of the child would otherwise be lost. In the case of the living child, however, it would be safer to carry the point of the hook into one of the anterior nares, as any possible injury to the tissues would here be of less importance than at the edge of the orbit.

We think, therefore, it should be a fundamental rule, in all cases of arrest of the head at the superior strait, in consequence of presentation of the base of the cranium, or of the base of the whole head, and where the hand and vectis fail, never to resort to the forceps, but to the blunt hook, applied to the orbit of the eye, or to the nares, while pressure may, at the same time, be made by the finger of the practitioner upward against the base of the occiput.

From the large size of the head, it may be possible that even this operation might fail. We have, then, a final resource in *craniotomy*. To perforate the head of the child, thus arrested at the superior strait, with the body delivered, often presents many difficulties, as the solid base of the cranium can alone be felt at the superior part of the pelvis. In this first position, however, the practitioner can generally carry his finger along the side of the child's neck to the mastoid process of the temporal bone, and direct the perforator above this process to the posterior inferior fontanel, through which he can penetrate into the cavity of the cranium. The brain will thus be broken up, and by making traction effort the occipital bone can be depressed so as to give the practitioner more command of the vault of the cranium, which, by means of craniotomy scissors or forceps, can be gradually destroyed; or the "compressor cranii" may be applied, so as to crush the whole head, and permit its descent.

In some instances, however, it may be absolutely necessary to divide the neck of the child to enable the practitioner to have sufficient command of the head to accomplish its delivery.

In these pelvic presentations, if the child's head has already passed the superior strait, and descended into the *cavity of the pelvis*, but is here arrested, the forceps may be employed after flexion has been established. (Plate XXIX., Fig. 142.) But generally, the bearing-down efforts of the mother, especially with some assistance on the part of the practitioner, will bring it readily to the *inferior strait*. If, again,

at this point there be difficulty in the delivery, great assistance can be rendered, in the manner already detailed, by the *hands* of the practitioner, in carrying the body of the child forward toward the abdomen of the mother, (Plate XII., Fig. 66,) while flexion of the head is facilitated by pressure of the fingers toward its mental extremity, either per vaginam or per rectum, assisted by pressure against the occiput behind the symphysis pubis; traction effort being made directly upward parallel to the bodies of the pubis, as formerly directed. So much can be accomplished in this way, that instrumental delivery will be rarely demanded. Nevertheless, where the head is very large, the perineum rigid, and the bearing-down efforts trifling, the *forceps* can now be readily applied, so as to be parallel to the occipito-mental diameter of the head, and become, therefore, the most efficient agent in finishing the process. (Plate XXIX., Fig. 141.) Should, unfortunately, the forceps not be at hand, much might be accomplished by the assistance of the *vectis*, which, carried over the side of the head to the top of the os frontis, would operate effectually in causing its descent, and thus the flexion of the head in its passage through the inferior strait and the vagina.

If there be no lever at command, the practitioner might, in some instances, carry a *fillet* over the back part of the neck of the child against the occiput, and make the traction effort downward and backward toward the perineum, in the direction of the cervicobregmatic diameter. He may thus facilitate flexion, and the consequent descent and delivery of the head. If, however, the forehead be still high up on the perineum, the fillet would be of little avail, although it might prove very useful as the chin approximates the os vaginae.

It must never be forgotten, in all pelvic cases, that rapid delivery is essential for the safety of the child as soon as the head has descended into the pelvis, as it is then out of the uterus, and the placental functions very universally cease in consequence of the detachment of this body from the surface of the uterus. It is equally important to remember that the contractions of the uterus have no further influence upon the descent of the head, which is now "extra-uterine," to be delivered, either by the voluntary efforts of the mother, or by artificial assistance.

We must conclude, therefore, as the result, both of theory and experience, that if the mechanism of labor be well understood, and the practical rules deducible therefrom be judiciously employed, the child's life, instead of being lost, in the proportion of one in every seven cases of pelvic delivery, might be almost as safe as in vertex presentations.

How often, for example, have children been sacrificed by the violent traction effort made in the direction of the axis of the inferior strait, when the occipito-frontal or occipito-mental diameter were engaged at the inferior strait; (Plate XXX., Figs. 147 and 148;) instead of making the traction effort directly upward parallel to the symphysis pubis, so that the sub-occipital portion of the head might impinge forcibly against the pubis, thus facilitating flexion, and the engagement of the cervico-bregmatic diameter!

How many children, also, have been lost because the forceps were not at command, when a scientific manual assistance, in facilitating flexion, and also in giving a proper direction to the tractive force, might have rapidly completed the delivery with perfect safety to the child and its parent! And, finally, how many have perished after the body has been delivered, and the head has passed into the pelvis, while the thoughtless or ignorant attendant was patiently waiting for the return of uterine contractions, or trusting the life of the child and the welfare of the parent to repeated doses of ergot! Private experience and the records

of the profession will give a melancholy answer to these inquiries.

Dr. Meigs, we should mention, is exceedingly urgent in his advice, that the accoucheur should have his forceps at command in every case of pelvic delivery, and believes that, owing to this advice, he has saved the lives of many infants. Of course, there can be no objection that the medical attendant should be fully prepared for the emergency; but we unite cordially with the opinion of M. Cazeaux, that the forceps are very seldom requisite in pelvic cases, even in primiparous patients. If traction be made upward, parallel with the bodies of the pubes, and flexion be facilitated by the hand or fingers to the face, by pressure per rectum, or on the perineum, the delivery of the child can very generally be rapidly accomplished. Precious time, we think, should not be wasted in waiting for the forceps, or even in attempts to produce respiration when the head is in the pelvis. Exceptionable cases, of course, may be met with, but they are certainly few.

The treatment of the right sacro-anterior position should be precisely similar as in the former case as

Fig. 68.



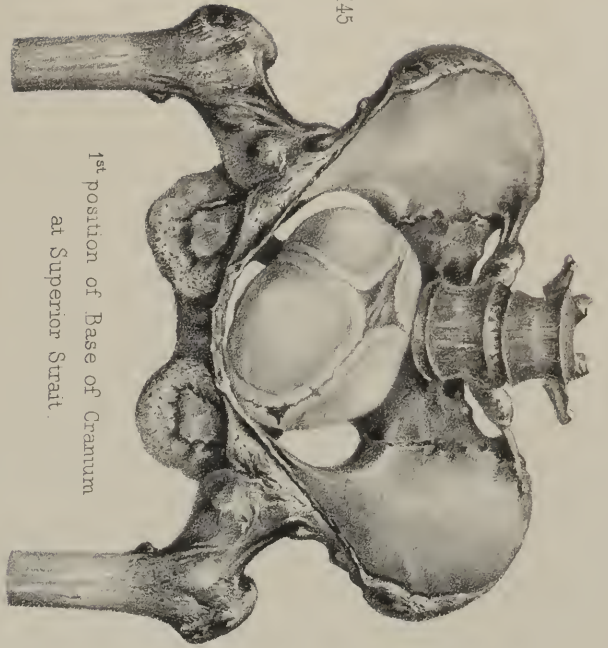
Pelvic Presentation. Occipito-Frontal Diameter, corresponding to the Sacro-Pubic, on account of Injudicious Traction.

regards the delivery of the breech, shoulders, and head, with the single exception, that rotation should be effected in the opposite direction. The right hip, shoulder, and parietal protuberance being at the left

acetabulum, while, in the first position, the left hip, etc., were at the right acetabulum.

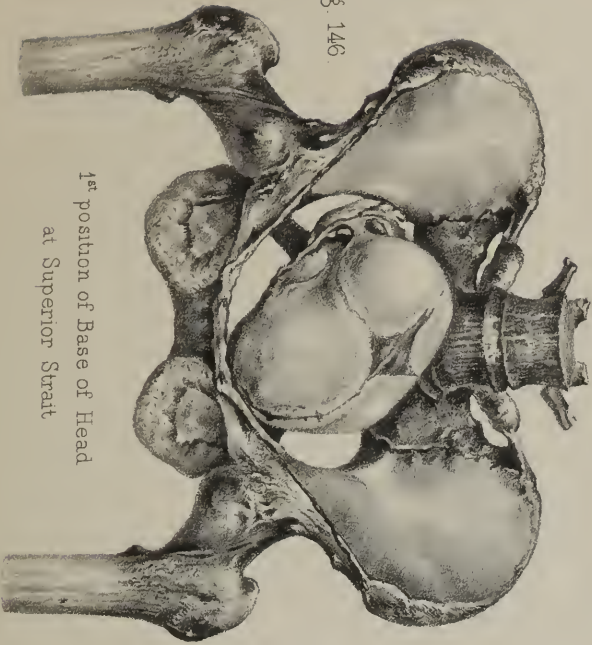
The treatment of the sacro-pubic position of a breech presentation must also be conducted upon similar prin-

Fig. 145



1st position of Base of Cranium
at Superior Strait.

Fig. 146



1st position of Base of Head
at Superior Strait.

Fig. 147



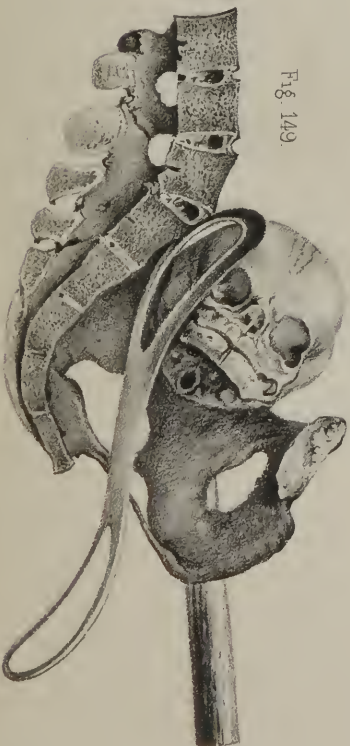
1st position of Base of Cranium
at Inferior Strait.

Fig. 148



1st position of Base of Head
at Inferior Strait.

Fig. 149



Transverse position of Base of Cranium
Vectis applied

ciples. In this case, however, as the hips of the child are transverse, the practitioner should be upon the alert, as soon as they descend into the cavity of the pelvis, to facilitate the rotation of one or the other hip forward, according as he observes any tendency of the left or right hip toward an anterior movement. It is all-important that such rotation should occur, not merely for the ready delivery of the hips and of the shoulders, but especially that the head may rotate with the body, and thus be more readily turned off from the lumbar vertebræ, that it may pass obliquely through the superior strait of the pelvis. When this change is accomplished, delivery will ensue, either spontaneously or artificially, precisely as in the first or second position. Should this desirable change not take place, and the head remain engaged between the pubis and sacrum by its cervico-bregmatic diameter, an immediate attempt should be made by the fingers or hand to effect its change into an oblique position.

This failing, flexion should be perfected by pressure with the *fingers* of the left hand on the side of the nose, and those of the right against the base of the occiput. If flexion be thus accomplished, and the head be still arrested, the *forceps* can be safely applied, and will usually be adequate to the delivery.

Should flexion, however, not occur, and the *base of the cranium* present in the direction of the sacro-pubic diameter, so that the occipito-frontal diameter of the head corresponds to the sacro-pubic of the strait, the first indication is to change the head by the finger or hand into an oblique position; this will be difficult, and often impracticable. The next indication would be to produce flexion, by pushing up the occiput with the *fingers* of the right hand, and depressing the face by two fingers of the left, on the superior maxillary bone. Should this effort be unsuccessful, a judicious attempt might be made by the *lever* applied over the side and top of the os frontis to induce flexion, and, as a final resort, upon the supposition that the child is still living, a *blunt hook* may be placed upon the anterior nares, and a sufficient force be applied to bring down the chin and face. The pressure by the hook will produce some lesion of the nose or lip, of minor importance, however, as the life of the child, under the circumstances stated, would be inevitably lost. We say *inevitably*, for, of course, the blunt hook should never be employed till all other rational means have entirely failed. The *forceps* ought to be excluded, as it would be impossible to apply them, except in the direction of the trachelo-bregmatic diameter. They would almost certainly, under these circumstances, seriously injure the scalp, and even cranium of the child, and probably, also, the tissues of the mother; and, finally, even if

traction effort were made, the long diameter of the cranium would be forced through the most contracted portion of the superior strait, to the detriment of the child and its parent.

If, therefore, the head be locked, from any cause, between the pelvis and the sacrum, by its occipito-frontal diameter, and the above measures be inefficient, *craniotomy* is our only resource.

The treatment of the right sacro-posterior position of a breech presentation, which is the reverse of the first position, is to be conducted in the first period of the second stage of labor precisely as in the sacro-anterior positions. The practitioner, therefore, as soon as the os uteri is fully dilated, and any complication be detected, should immediately determine whether to allow the breech to descend or whether version by the feet would be more advantageous. In the former case, assistance, when demanded, may be rendered by the fingers, the fillet, or the blunt hook.

As soon as the breech has passed the os uteri, much attention should be paid, in this case, to facilitate rotation of the right hip toward the pubis. This can generally be effectually accomplished by acting upon the right thigh of the child by means of the index finger, directing it, during every pain, backward and to the left as far as practicable. This being accomplished, the right hip will be delivered under the arch of the pubis as in the second position of the breech; but the pelvis being delivered, restitution will bring the body into its original oblique position. Hence, the practitioner should attend, sedulously, to effecting a similar rotation in the shoulders, so as to bring the right shoulder to the arch of the pubis, provided this does not readily occur; while the usual attention should be paid to the arms, so as to cause their descent on the sides of the thorax and abdomen.

As the shoulders of the child are thus passing the inferior strait and the vulva, the patient should be encouraged to "bear down" as much as possible, the practitioner refraining from any traction effort, so as, by these measures, to facilitate flexion of the head. If injudicious traction should be made, the presentation of the chin would be changed into that of the base of the cranium, or that of the base of the head. (Plate XXXI., Figs. 151 and 152.)

When treating of the mechanism of labor, it was shown that in these fourth positions, especially where the hip and shoulder have completely rotated toward the pubis, such an inclination has been given to the occiput that it will often rotate on the right anterior inclined plane, thus becoming a second position. It is the business of the accoucheur, therefore, not merely to secure the rotation of the shoulder to the

pubis, but also to determine the face backward toward the sacrum, and thus facilitate the favorable change just mentioned. As soon, therefore, as the shoulders are delivered and the head has passed through the superior strait and os uteri, the finger should be applied over the right cheek and temple of the child, by which the chin may be directed posteriorly.

In this way an occipito-posterior delivery in pelvic presentations will be as rare as in cases of vertex presentations—conversion from the fourth to the second being very generally accomplished.

To this conversion no serious objection can be offered, for there is plenty of room, as the head is between the superior and the inferior strait, and out of the uterus; and, moreover, the body, being completely delivered, can be externally rotated synchronously with the internal rotation of the head, so that there will be no torsion of the neck and no lesion of the spinal marrow.

Let it be remembered that all such revolutions of the head should be accomplished not by one sudden effort, but by acting steadily at each successive return of the uterine contractions.

The practice now recommended will be found in direct opposition to that advised by M. Baudelocque, Dr. Dewees, and others. These gentlemen direct that in these sacro-posterior positions, as soon as the limbs are delivered, the whole body should be pushed up, during the absence of a pain, and rotated, so as to bring the spine forward, under the expectation that the head will also turn, so that the occiput will become anterior. This manœuvre is to be repeated under the idea that the head will be movable during the absence of uterine contraction, and that it would turn without any serious torsion of the neck. Perhaps this is possible, but certainly very improbable, for, strictly speaking, there is no complete relaxation of the uterus during the intervals of pain; there is still powerful tonic contractions firmly embracing the head of the child. The neck also is so flexible that any twist of the body will not produce much effect upon the head, but will be spent on the cervical vertebrae, and, of course, will greatly endanger the spinal marrow. The practice, therefore, should be condemned as dangerous to the child, and in itself very inefficient. On the contrary, if the head be allowed to descend into the pelvis, and be completely disengaged from the uterus, the force necessary to secure rotation can be applied directly to the head and with no danger to the welfare of the infant.

If, however, rotation have occurred in the opposite direction, so as to bring the os frontis under the pubis, then the body of the child should be immediately carried backward and downward—the hips of the patient,

if she be upon her back, being brought completely to the edge of the bed. Traction may now be made backward and downward, so that the sub-occipital region of the head will press against the fourchette, and thus facilitate flexion as well as the descent of the head. (Plate XIII., Fig. 70.)

When speaking of the anterior positions, we strongly insisted that traction should be made directly upward, with the neck of the child parallel to the symphysis pubis. In these posterior positions traction backward is equally important, and will perhaps be more efficient, inasmuch as the perineum yields readily, thus augmenting the orifice of the vagina. To make traction, as has been too frequently done, in the direction of the axis of the inferior strait, would be very improper, and even deleterious; and we feel surprised, therefore, that M. Chailly, who seems to have comprehended so well the mechanism of labor, should recommend that traction should be made horizontally, and not vertically, when the patient is supine. Flexion may be still further assisted by the fingers of the right hand against the forehead, depressing it under the arch of the pubis, so that the cervico-bregmatic diameter may correspond to the inferior strait and to the orifice of the vagina.

If from any untoward circumstance the head should still be arrested, the means just mentioned not being sufficient, the *forceps* may be employed. The blades being applied parallel to the occipito-mental diameter of the head, (Plate XXIX., Figs. 144 and 143,) the handles should, during the process of extraction, be carried gradually backward toward the breast of the child, so as to increase flexion. Great care should be taken that the blades should not correspond to the trachelo-bregmatic diameter, as has been recommended; for then the extremities of the blades would project above the sinciput, with danger to the mother's tissues, and the head would be drawn down with its occipito-frontal diameter instead of the cervico-bregmatic to the cecy-pubic.

If these be not at command, the *lever* may be passed under the occiput, and be used very efficiently in elevating the occiput toward the pubis, and thus increasing flexion and descent.

Should neither of these instruments be within reach, the *fillet* may be passed over the back and neck of the child to the base of the occiput, and traction effort be made in the direction of the cervico-bregmatic diameter, which would very effectually fulfil the same indications.

In these occipito-posterior positions the head may be arrested at the outlet by the occipito-frontal or the occipito-mental diameter extending from the lower part

Fig. 150

1st position of Base of Cranium
Blunt Hook applied

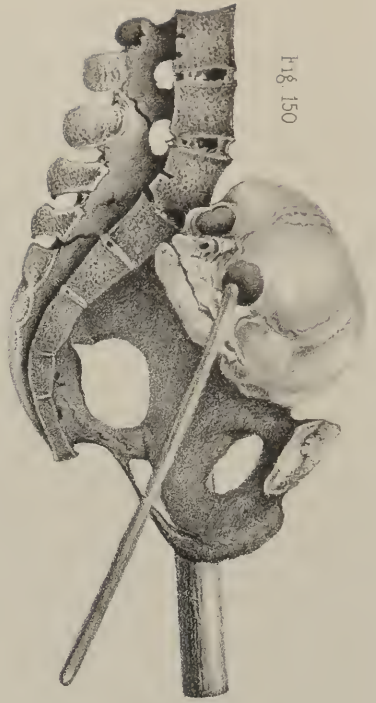


Fig. 152

4th position of Base of Head
at Superior Strait

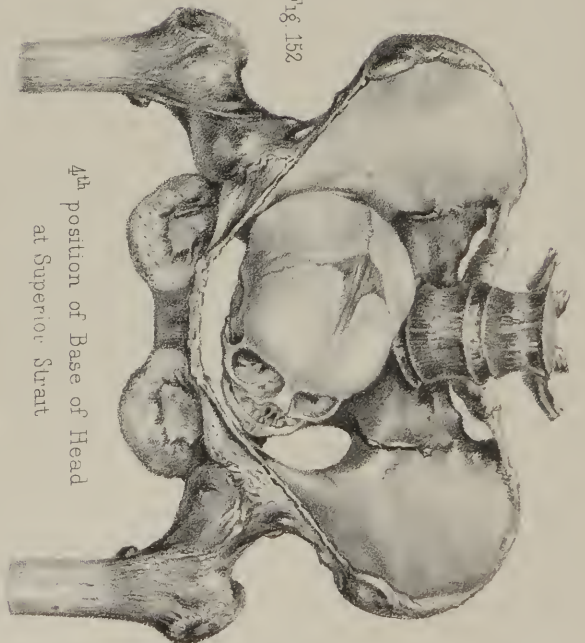


Fig. 151

4th position of Base of Cranium
at Superior Strait

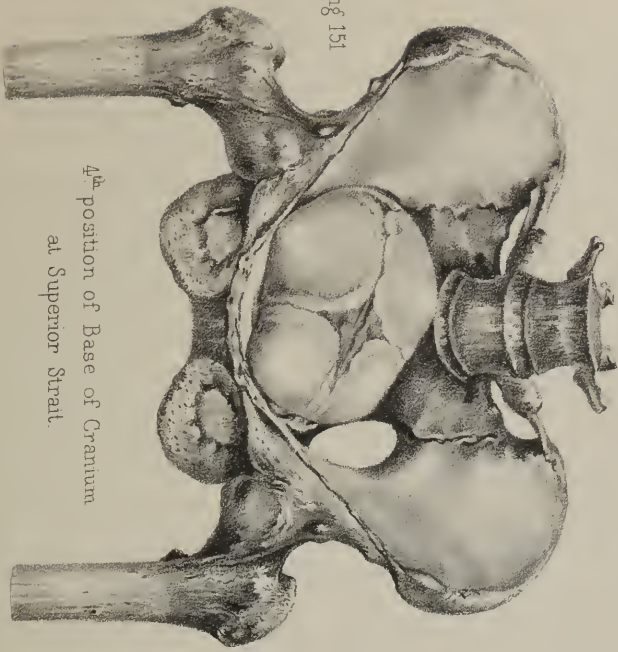


Fig. 153.

4th position of
Base of Cranium
at the
Inferior Strait

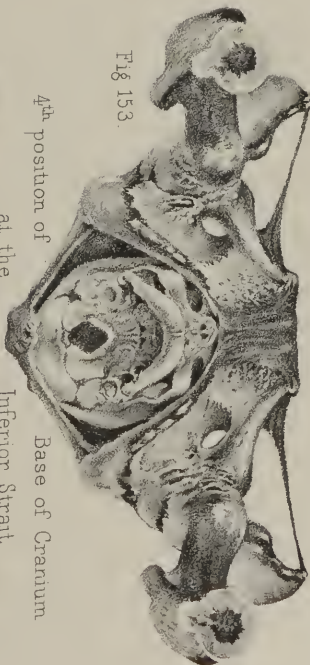


Fig. 154

4th position
of Base of Head
near the Inferior Strait.



of the sacrum or coccyx to the body of the pubis; in other words, by presenting the "base of the cranium," (Plate XXXI., Fig. 153,) or that of the whole head at the inferior outlet. (Plate XXXI., Fig. 154.) The head, in such cases, is arrested above the inferior strait, for neither the occipito-mental nor the occipito-frontal can, when the head is in due proportion, pass between the coccyx and pubis.

The most improper practice has been resorted to in these instances, even by experienced practitioners, who have attempted to accomplish delivery by mere force and not by art; making most powerful traction effort upon the body of the child in the direction of the axis of the inferior strait. By such traction, it is possible that the head may be drawn out, the os coccygis yielding, and the perineum being much relaxed; the occiput would then greatly distend the perineum, and the chin would rise up behind the symphysis, so that the trachelo-occipital diameter is forced through the inferior strait and the vulva, with great danger to the tissues of the mother and to the welfare of the child. In other cases, when the perineum and os coccygis are rigid, delivery in this mode has been exceeding difficult, and even impracticable; and instances are not wanting where the tissues of the neck have been ruptured, and a headless body presented to the operators.

Two modes of operating promise very much, in such cases, where the chin of the child is behind the symphysis pubis:

First. Let the whole head, during the absence of a pain, be pushed directly upward, so as to elevate the occiput above the os coccygis, and then cause rotation of the head—by pressing the fingers upon the side of the face in the manner already directed, that the chin may be determined from the pubis to the sacrum.

Dr. Penrose has reported an interesting case of this kind, in which he was very successful, by the means above indicated, in causing the rotation of the head in the cavity of the pelvis, so as to convert an occipito-posterior into an occipito-anterior position. The child survived.

We decidedly prefer operating upon the head by the fingers alone, which occupy very little space, to the practice recommended by the Continental authorities of passing the whole hand into the pelvis over the sacral side of the head, and bending the fingers forward over the face of the child, so as to turn it toward the sacrum. This operation with the hand must be very painful to the mother, and very awkward and difficult to the accoucheur, and probably more inefficient than when the change is attempted by the fingers alone.

Second. The mode, which is sometimes more practicable, is to push up the lower jaw behind the body of

the pubis, and immediately carry the whole body of the child forward toward the abdomen of the mother, and then make traction effort directly upward parallel to the anterior surface of the pubis.

By this manœuvre the tracheloid region of the neck will be directly under the sub-pubic ligament, (Plate XXXII., Figs. 155 and 156,) upon which it will be fixed, as a fulcrum, and the head will be employed as a lever of the third kind; the occiput passing along the plane of the perineum, and the chin descending from its position behind the pubis, will pass backward toward the sacrum, coccyx, and perineum. The head, therefore, is, by these means, rapidly extended, and it will be found that the trachelo-occipital, the trachelo-bregmatic, the trachelo-frontal, and the trachelo-mental diameters, will appear in succession at the inferior strait; the head passing through the vulva as soon as the trachelo-bregmatic diameter appears at the os vaginæ. It is manifest, therefore, that the head is thus made to pass through the inferior strait of the pelvis, presenting its "short" diameters as accurately as in original occipito-anterior positions.

A comparison made will show a great similarity between the passage of the head, in the case now described, and that which is noticed in the mento-pubic positions of the face at the inferior strait and vulva. (Plate XXVI., Fig. 131.) In both the trachelo-bregmatic diameter is concerned, but in the latter the neck of the child is within the pelvis, necessitating flexion of the head; the power, applied through the medium of the spine, being also within; but in the former the neck is exterior against the pubis, and the power is the traction effort made by the accoucheur externally, necessitating the extension of the head.

Let it be remarked, also, that this traction effort—and of course the extension of the head—can be facilitated by the fingers against the perineum, or acting per rectum, so as to determine the occiput from the posterior to the anterior portion of the perineum, at the same time obviating the danger of laceration of this tissue.

If, unfortunately, from its size, or any other cause, the head should be arrested with the anterior fontanel to the coccyx, and the front of the neck to the pubis, the forceps can be readily applied, with the blades corresponding to the occipito-frontal diameter, and delivery be effected where manual assistance was insufficient. (Plate XXXII., Fig. 156.)

The treatment of the left sacro-posterior position of a breech presentation, the reverse of the second position, should be conducted precisely upon the same principles as those just indicated for the fourth position. The only modification demanded is, that rotation

of the breech, shoulders, and head, should be in an opposite direction. Hence, as the left side of the child is now pubic, pressure should be made so as to direct the left hip and shoulder to the pubis, from the left anterior inclined plane toward the right anteriorly.

As soon as the body is delivered, and the head has descended into the pelvis, pressure should be made upon the left side of the face, to determine it posteriorly, so that the occiput may get behind the pubis, as in an original first position.

If, however, it be found that the occiput has rotated to the hollow of the sacrum, and the os frontis toward the pubis, the case is to be managed precisely as in the former instance.

The treatment of the sacro-sacral position of a breech presentation is perfectly analogous to that of the third position, bearing in mind that now the anterior surface of the child is forward instead of being backward, as in the third position. Hence, as soon as the hips have passed the superior strait, the practitioner should endeavor to facilitate rotation in the most practicable direction, whether to the right or left, so that one or the other hip shall approximate the pubis.

When the shoulders descend into the pelvis, the same attention should be paid to secure their rotation, under the strong hope and expectation that although some twist may occur in the neck of the child, yet that the head will so far move with the shoulders as to assume somewhat of the oblique position; indeed, this will almost necessarily ensue from the great convexity of the occiput and lumbar vertebræ. Hence, as the child descends, the original direct position of the head is changed to one side or the other, it being virtually converted from the sixth to a fourth or fifth position, and is treated accordingly.

If it should unfortunately occur, from any cause, that after the body is delivered, the os frontis should be still found against the pubis, the practitioner, by pressure upon the side of the face or temple, should endeavor to effect a desirable change of its position. If this cannot be accomplished, the body of the child is to be pressed backward as far as possible, avoiding traction effort, while the practitioner, by his *fingers* to the face and forehead, should depress the chin toward the breast, so as to increase flexion as far as practicable, before any traction is made upon the body. If this cannot be accomplished by the fingers, a *lever* may be applied over the side of the os frontis—great care being taken not to injure the bladder or urethra of the mother, and thus facilitate flexion, after which traction effort may be made, as far as practicable, in the axis of the superior strait of the pelvis. If this be

not sufficient, and the head be flexed, the *forceps* may be applied. (Plate XXIX., Fig. 143.)

Should, however, the child be dead, and the occipito-frontal or the occipito-mental diameter be engaged in the sacro-pubic diameter of the superior strait, then flexion may be effectually induced by the use of the *blunt hook* to the nostril or orbit of the eye.

In these sixth positions, after the head has entered the cavity of the pelvis, there can be no hesitation, although the occiput originally presented toward the sacrum, of attempting to push the face not only toward the left or right acetabulum, but also to cause it to rotate posteriorly to the hollow of the sacrum, thus converting an original sixth position into a first or second. Although the rotation in this case would be to the extent of half a circle, there is no danger of injuring the spinal marrow; for the body being delivered, it can be readily accommodated to the rotation of the head in the pelvis, so that no twist need occur in the neck of the child. In this respect, the sixth positions of the breech have an advantage over those of the vertex; for if these last are converted into a fourth or fifth position, it will be unsafe to continue the rotation to a first or second, as already detailed.

IRREGULAR PRESENTATIONS OF THE BREECH.—

Under this general head, authors usually include what are called deviated positions of the breech, those in which the coccygeal extremity of the ellipse is not to be found toward the centre of the pelvis, but is detected toward its anterior or posterior portion, or toward one of the sides of the pelvis. It is manifest, that in such cases, the axis of the ellipse must be oblique, as regards the superior strait; and although this may possibly occur when the liquor amnii is abundant, from an altered position of the child in the uterus, yet it generally presupposes obliquity of the uterus itself; the axis of the fœtus and that of the uterus being coincident but deviated from that of the superior strait of the pelvis. Hence there is not a full presentation of the breech, but some deviation exists. On examination per vaginam, at the commencement of labor, a portion of the sacrum or the posterior part of the thighs may be felt toward the centre of the pelvis; while in other instances, one hip or the opposite may be recognized as presenting. We cannot believe, that in practice, such deviations are of any importance, for, as in deviated presentations of the nose or face, as soon as the waters are evacuated and the bearing-down efforts established, such deviations are spontaneously rectified. They demand no other attention than that of correcting the obliquity of the uterus, which we shall hereafter detail. When speaking of

trunk presentations, we shall explain how it is that such favorable changes readily occur, after the expulsive efforts are in full operation.

PRESENTATIONS OF THE FEET.—But as formerly detailed, irregular presentations of the pelvis include those of the feet and knees, which may require some special attention, although the mechanism of labor and hence scientific treatment differ very little in any of these varieties.

Treatment.—Whenever this presentation is recognized, the necessity of preserving the membranes entire as long as practicable, and of retaining the feet at the orifice of the uterus, until the os uteri is fully dilated, has been already explained. When, however, the natural powers fail, the practitioner must introduce his hand to bring down the feet. It is possible that in some rare instances where the child is dead, a blunt hook may be found advantageous to bring down the

thighs and legs of the foetus; but almost universally the hand is sufficient for this purpose. Of course the subsequent delivery must be in accordance with the rules already established.

PRESENTATIONS OF THE KNEES.—This must be conducted in a similar manner; there will be no necessity in such cases, however, to bring down the feet; for, if traction effort be imperiously demanded, there will be no difficulty in making such effort, by means of the finger passed over the posterior part of the thigh to the knee. Pressure may thus be alternately made to the pubic and the sacral limb very efficiently. The legs, being retained by pressure against the sides of the uterus and pelvis, will seldom unfold, until they are delivered externally. In bad cases, where more force is required, the fillet or blunt hook may be substituted for the finger applied over the posterior surface of the knee.

CHAPTER XIX.

DYSTOCIA.—COMPLICATIONS FROM FŒTUS.—MAL-PRESENTATIONS.

ANY portion of the body of the foetus may be occasionally recognized at the commencement of labor toward the centre of the os uteri.

PRESENTATIONS OF THE TRUNK.

Under the general expression of *Presentations of the Trunk or body of the Fetus* is included all those presentations in which one or other extremity of the foetal ellipse does not appear at the centre of the pelvis. Hence we read in the old authors, of presentations of the anterior and posterior as well as of lateral portions of the foetus, and these were again subdivided into three or four distinct presentations, according as particular parts of the back, etc., might be early felt in labor. This multiplication of presentations of the trunk, in divers positions, giving rise to multiplicity of directions as to the management of such cases, serves to confuse the minds of students and practitioners, and has been productive of much mischief. Observa-

tion has proved, however, that, *practically*, all these divisions, with one or two exceptions, are unnecessary; that almost universally these presentations are not persistent; that under the influence of the expulsive powers of the uterus, they resolve themselves into cephalic or pelvic presentations, or into presentations of the right or left shoulder or side of the thorax.

The history of the change of opinions, among obstetricians, on this subject, is very interesting. We have no space for the record; neither, indeed, do we consider it requisite, inasmuch as almost every writer has presented such history more or less completely. We would cheerfully, however, give to Madame Lachapelle, M. Stoltz, and also to Professor Nægelè the credit of establishing the fundamental fact that all these presentations of the body, with a few minor exceptions, resolve themselves into those of the sides of the thorax. This is a most interesting and important fact—its causes should be accurately understood, as these spon-

taneous changes will afford proper indications for the management of such mal-presentations.

Fig. 69.



Presentation of the Back.

To understand the *modus operandi* by which the expulsive powers of the uterus produce, more or less

Fig. 70.



Presentation of the Abdomen.

efficiently, favorable changes in the presentation, a few well-known facts should be constantly remembered.

In the first place, the *flexibility of the body of the*

fœtus is very great in the neck, less in the loins, and very moderate, comparatively, in the dorsal region. Hence, the child, under the influence of uterine contractions, never can maintain a strictly transverse position, as is too frequently represented in the engravings and works of obstetric authors; but, as formerly mentioned, it will be rolled up into an elliptical or perhaps even into a spheroid shape, the head approximating the pelvis, and the pelvis the head.

In the second place, it must also be borne in mind that on all occasions the *contractions of the fibres of the uterus diminish its size in every direction*, not only longitudinally and obliquely, but also circularly. Hence, in so-called transverse positions of the child, where the head is upon one side and the pelvis upon the opposite, the tendency of these circular contractions must be to diminish the long axis of the foetal ellipse, and, of course, increase the curvature of the body of the foetus.

In the third place, it should be remembered that the *contractions of the abdominal muscles and diaphragm force the whole lower part of the uterus against a very concave surface*, as formed by the iliac fossæ and the lower portion of the walls of the abdomen. Hence, during the bearing-down efforts, the child is made to press upon this concave surface through the medium of the uterus, the necessary consequence of which is not merely that the curvature of the foetus should be increased, but that its convex surfaces will roll upon the concavities of the iliac fossæ in one direction or another, according to various circumstances, connected with the original presentation of the foetus.

For example, in some instances it will be found that the nucha or posterior portion of the neck, will be toward the centre of the pelvis, having the occiput toward the left iliac fossa and the sacrum to the right side of the uterus. As soon as the waters have been evacuated and the contractions of the uterus fully instituted, it is manifest that the pelvis of the child must be forced by the circular fibres of the uterus nearer and nearer to the central line, increasing, of course, the anterior flexion of the neck; while the occiput, playing upon the concave surface of the left ilium, must, under these circumstances, be forced downward toward the brim of the pelvis, and finally glide into the superior strait. Of course, the neck disappears from the centre of the pelvis, to be followed by the occiput; there is a conversion therefore of the presentation of the neck into that of the occiput. That the occiput, in this case, should descend, instead of the pelvis, arises not only from the fact that the occiput is lower down, nearer to the strait, but that the long arm of the lever, as regards the foetus—extending, in this

case, from the neck to the breech—being acted upon by the sides of the uterus, will be determined from the right to the left side toward the axis of the uterus, while the short arm—from the neck to the top of the head—will necessarily be determined from the left to the right, to the centre of the pelvis. This is "*spontaneous version*" of the fœtus; that is, a change of presentation—that of the neck into that of the vertex.

If, however, the sacrum should be found presenting at the superior strait of the pelvis, with the head toward the right side of the uterus, and the lower extremities toward the left iliac fossa, it is equally evident that the head will be determined from the right toward the left to the centre of the uterus, and the lower extremities will as necessarily glide from the left toward the right to the centre of the pelvis: a presentation of the sacrum is thus converted into that of the breech, for in this case the long arm of the lever extends from the sacrum to the vertex, and the short arm from the sacrum to the tubers of the ischii.

These considerations very satisfactorily elucidate the causes for spontaneous version of the fœtus, although it may be impossible, under every presentation of the trunk, to determine, *à priori*, what change will actually occur. For example, if the dorsal or scapular region of the spine should present, the contractions of the uterus might, in some instances, bring down the occiput, while, in other cases, the pelvis will appear at the superior strait, as there may be many minor causes which will determine the inclination of the body in one direction or the other—such as the degree of flexibility of the infant, the relative height which the occiput or pelvis originally occupied in the uterus, the position of the uterus itself, whether oblique to the right or left side, etc. There is, however, one important mechanical element which should not be forgotten in speculations as to spontaneous version, viz., *the greater comparative size and firmness of the head*; hence it is reasonable to suppose that if the body of the child were equally poised over the superior strait, the occiput upon the one side and the sacrum upon the other, the circular contractions of the uterus would operate far more efficiently in determining the head rather than the pelvis from the iliac fossa toward the fundus of the uterus; that is, it would be much more probable, in all such cases, that the pelvis should descend rather than the vertex. These, however, are minor points, if the general principles already stated be fully recognized.

Experience seems to have determined, with comparatively few exceptions, that presentations of the trunk may, from the influence of the above causes, often be resolved into cephalic or pelvic presentations, generally

with very little risk to the child or parent. To this, however, there are two very important exceptions; for, although presentations of the left or right side of the abdomen may be readily converted into pelvic presentations, yet those of the sides of the thorax very generally remain persistent; and presentations of other portions of the trunk may often be resolved into shoulder, instead of cephalic or pelvic presentations. Hence, in practice, we will have occasion to contend with presentations of the right or left shoulder at the superior strait. First, then, of

PRESENTATIONS OF THE RIGHT SHOULDER.—Why a presentation of the shoulder should remain more persistent than other portions of the trunk has not been sufficiently explained. It would, however, appear to arise from the great flexibility of the neck, so that when the side of the head rests upon the iliac fossa, the body of the child, or the long arm of the lever, is rapidly determined toward the central line; the lateral flexure of the neck occurs so readily that the head and thorax are simultaneously determined toward the pelvic opening. In this position it becomes fixed, by the bearing-down efforts of the uterus, in consequence of the projection of the shoulders as formed by the clavicle and scapula being pressed firmly against the margin of the os uteri and the superior strait, thus preventing further change.

In presentations of the shoulder, it is a matter of minor importance, whether the arm be retained within the uterus, or whether it glides out of the os uteri, through the pelvis and os vaginæ; yet, upon the whole, it is more favorable, as will be seen, that it should be retained within the uterus.

The causes of shoulder and other trunk presentations are enveloped in obscurity; they are connected possibly with obliquities of the uterus, but, perhaps, more frequently, with spontaneous motions of the child, when a large quantity of the liquor amnii exists. They are most common when the pelvis is deformed, and also in cases of premature delivery. We can perceive no ground for the belief that they depend upon partial or irregular contractions of the uterus, or to any irregularity of its form.

The *diagnosis* is often difficult at the commencement of labor; practitioners of experience can, perhaps, form some idea of the existence of a transverse presentation from the form of the uterus, as ascertained by an external taxis, especially where the patient is thin, and there is no distension of the abdominal cavity from gas, feces, water, etc. It is said that, under these circumstances, the transverse diameter of the uterus can be recognized as greater than the longitudinal. This,

however, must be doubtful in most cases, inasmuch as the form of the uterus depends, not simply upon the position of the child, but also upon the liquor amnii still present. It must also be remembered that the child does not remain transverse, in the strict sense, as a cork may in a bottle, but is always bent to a greater or less degree. In some instances, the head of the child may be felt more or less distinctly toward one of the iliac fossa, or even above the pubis.

Auscultation may occasionally afford some assistance in diagnosis, but, for obvious reasons, cannot be perfectly satisfactory.

On examination, per vaginam, at the commencement of labor, the os uteri is usually found high up, imperfectly dilated, and the bag of waters small, while pressure toward the lower part of the uterus, and even against the membranes, does not readily reveal the presentation. Afterward, when the os uteri is more fully dilated, the body of the child can be reached, and occasionally the presentation determined before the membranes are ruptured; especially if the arm descends before the shoulder. After, however, the evacuation of the waters, the presentation can generally be made out by careful examination by the finger introduced into the uterus, demanding, perhaps, in some instances, the previous introduction of the hand into the vagina. The practitioner should be careful clearly to ascertain the anatomical points concerned, especially the acromion process, clavicle, spine of the scapula, and the angular space between them, bounded by the side of the neck of the child. We should ascertain the position of the scapula, and also, if possible, of the spinous processes of the vertebræ, so as to determine whether the back of the child is anterior or posterior. Let him also examine the axilla, where he may recognize, not only its boundaries, formed by the pectoral and dorsal muscles, but also detect some of the ribs and their intercostal spaces. He can also determine to which side of the pelvis the axilla is directed, and hence the positions of the head, which, of course, will be in an opposite direction. He should not be satisfied that it is a presentation of the shoulder because the arm has descended, as this accident may occur in presentations of the head.

Care also should be taken to determine the proper position of a shoulder presentation; for practical purposes, only two positions of the right shoulder need be regarded, according as the back of the child is toward the anterior or posterior part of the pelvis. In the former case, it is evident that the spine, being toward the pubis, and the right shoulder toward the centre of the pelvis, the head will be toward the left side, and the breech toward the right; and, although the occiput

may be toward the anterior, the middle, or posterior part of the superior pelvis, this is of minor importance, and we speak, therefore, of this being the *dorso-pubic* or the left occipito-iliac position of the right shoulder.

In other instances, the back of the child, in presentations of the right shoulder, will be found posteriorly, then the occiput will be toward the right side of the superior pelvis, and the breech toward the left; this constitutes the *dorso-sacral*, or the right occipito-iliac position of the right shoulder.

The former has been called the *first*, and the latter the *second* position of the right shoulder.

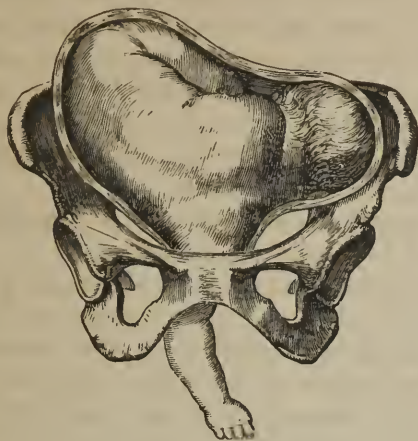
To determine whether it be the right or the left shoulder is a matter of great importance. By ascertaining, as just mentioned, the precise position of the top of the shoulder, of the axilla, and of the scapula, we, of course, know that if the back be toward the pubis, and the top of the shoulder as represented by the clavicle and spine of the scapula be toward the left side, then the head must be at the left iliac fossa—it is a dorso-pubic position of the right shoulder. If, on the contrary, the top of the shoulder be toward the right side of the pelvis, and the back toward the posterior part of the pelvis, then the head will be toward the right iliac fossa—it is a dorso-sacral position of the right shoulder.

If the arm has descended into the pelvis, the diagnosis will be easier, in some respects. It has been said that if the back of the hand be anterior, it would indicate that the back of the child was toward the pubis; but care must be taken to ascertain carefully the condition of the arm, as to pronation or supination, otherwise, the palmar surface of the hand might represent the spine. It has been remarked, also, that if the hand, when protruded externally, be turned with the palm upward toward the pubis, the thumb will be toward the right thigh, and the little finger toward the left, if it be the right shoulder in either position. The reverse occurs, in the position of the thumb and finger, if it be the left shoulder presenting; that is, the thumb, when the palm is turned upward, will be toward the mother's left thigh, and the little finger toward the right. Although this be true, a proper diagnosis cannot be fully established without accurate examination of the anatomical parts of the shoulder at the orifice of the uterus.

Dorso-Pubic Position.—The mechanism of labor in the dorso-pubic position of the right shoulder generally terminates in the manner already intimated. The bearing-down efforts being established, the shoulder sinks more or less through the superior strait, with the great lateral flexure of the neck on the left side, owing to the occiput being retained above the brim of

the pelvis, while the breech of the child, by the circular contractions of the uterus, is forced to a greater or

Fig. 71.



Dorso-Pubic Position of the Right Shoulder.

less degree from the right side toward the middle of the uterus, thus producing a great lateral flexure of the body of the child on its left side. The expulsive forces, therefore, have a tendency to drive the body of the child and head directly downward into the pelvis; but owing to the flexibility of the neck of the child, the head and the thorax meet at the superior strait, and, of course, no further descent is practicable, except what may be gained by the joint compression of the chest and head, which is very trifling. Hence, there is usually an *arrest* to the progress of the child—it perishes—and, without artificial assistance, the mother also dies from exhaustion, from inflammation, or even more speedily from the rupture of the vagina or uterus. It is a case of “impracticable labor.”

To these general observations there are a few exceptions in which the mother may eventually deliver herself. The mode in which this has been accomplished should be carefully studied, as forming the foundation of scientific practice in these deplorable cases.

We have already endeavored to explain the *modus operandi* by which the expulsive efforts of the uterus may produce a spontaneous change of most of the presentations of the trunk into the cephalic or pelvic presentations, and also intimated the reasons why those of the shoulder are generally persistent. Dr. Denman, however, has taught us that even in cases of shoulder presentations there may be sometimes a “*spontaneous version*” into that of a vertex or breech; that in a very few instances this has been noticed, before the membranes have been ruptured,—especially where there has been a large quantity of liquor amnii; that in a few others, however, after the waters have been long evacuated, and the contractions of the uterus been

exceedingly powerful and protracted, observation has proved that the shoulder has gradually departed from the superior strait, and the head has descended from the iliac fossa into the cavity of the pelvis, producing, therefore, a spontaneous and favorable version; while, in other instances, that the shoulder has receded in an opposite direction, and the side of the thorax, abdomen, and hip successively appeared at the centre of the pelvis, and eventually the breech descended into its cavity,—spontaneous version from a shoulder to a breech presentation.

This version is more apt to occur when the arm is retained within the uterus; and it is much more difficult to accomplish when the arm has been previously delivered. The mode by which this favorable change is accomplished is precisely analogous to that in other presentations of the trunk. The chief resistance to such spontaneous version would seem to be not merely the flexibility of the neck, but the projection of the shoulder through the os uteri and the superior strait. We can readily imagine, therefore, when powerful bearing-down efforts exist, that the resistance of the shoulder might be overcome, owing to its mobility, allowing it, therefore, to glide upward on the iliac fossa, so as to permit the descent of the breech on the opposite side of the pelvis; or we may suppose that the resistance of the shoulder may be avoided by the rotatory motion of the child upon its own axis, so that the shoulder, which had projected into the pelvis, in this dorso-pubic position will gradually recede from the centre to the posterior part of the pelvis, so that a presentation of the scapular or dorsal region might ensue, under which circumstances spontaneous version into a cephalic or pelvic presentation might much more readily occur. But whatever be the precise explanation of the phenomena, practical men have occasionally met with these spontaneous versions in shoulder presentations, where the woman has been vigorous, her pains strong, the child very flexible or of small size. Nevertheless, almost universally the foetus perishes, and the mother is exposed to great danger.

To Dr. Denman the profession is indebted for fixing attention upon this important fact. Unfortunately, however, he names it a “*spontaneous evolution*” of the infant, instead of “*version*” or turning in the cavity of the uterus and above the superior strait of the pelvis. It is analogous to what practitioners have observed as occurring in the uterus before the membranes are ruptured, and also to the change which is so often artificially produced by the hand of the operator.

Mr. Douglass, of England, in 1811, criticised, we think, unjustly, the above account of spontaneous

version of the fœtus; but he deserves much credit in describing another mode of delivery, materially differing from the former, and now designated by the expression, a "*spontaneous evolution of the fœtus*," which does not always occur, but affords another mode of delivery where version is not practicable. This evolution Mr. D. termed "*spontaneous expulsion*" of the fœtus.

In the dorso-pubic position of the right shoulder, which we are now considering, it has already been mentioned, that by the contractions of the uterus the body of the child is directed very much toward the axis of the superior pelvis, but the delivery is generally arrested, owing to the head and chest meeting at the superior opening of the pelvis. It has been found, under these circumstances, that if the powerful contractions of the uterus continue, the head will,

Fig. 72.



Spontaneous Evolution.

in some instances, glide along the horizontal ramus of the pubis toward the symphysis, and the breech

Fig. 73.



Spontaneous Evolution continued.

of the child be determined posteriorly—the whole fœtus thus rotating from right to left posteriorly, and

from left to right anteriorly. Now, upon a careful examination, the head may be felt through the lower part of the abdomen over the pubis; the arm of the child will be out of the vagina, the right side of the neck on the inside of the pubis, and the top of the shoulder under the arch; while the right side of the thorax will be found subtending the cavity of the pelvis from the anterior toward the posterior part somewhat obliquely. Under these circumstances, powerful contractions of the uterus will increase the flexion of the body upon its left side, while the right side of the thorax will descend further into the pelvis and be pressed downward and toward the anterior part, dilating the perineum and vulva; while the top of the shoulder will continue to advance under the symphysis pubis until completely arrested by the root of the neck. The pains continuing, the right side of

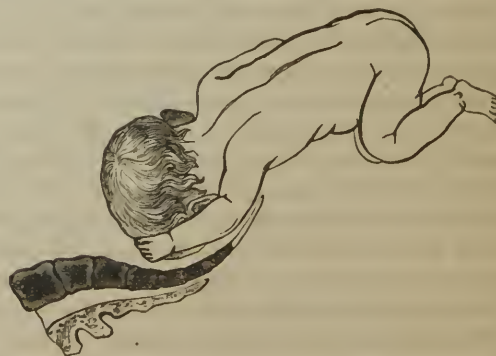
Fig. 74.



Spontaneous Evolution continued.

the thorax will distend the perineum more and more until it protrudes from the vulva, followed by the side

Fig. 75.



Spontaneous Evolution completed.

of the abdomen, the right hip, the nates, and the lower extremities. The whole body being thus extricated,

the head will descend into the cavity of the pelvis, and be delivered as usual in pelvic presentations.

It is manifest from this account of spontaneous evolution, that the slight depth of the anterior part of the pelvis will allow the child's head to be above the superior strait and the shoulder underneath it, and the root of the neck then becomes the fulcrum or prop on which the body of the child revolves—the whole right side descending on the posterior part of the sacrum and perineum to the vulva, in the same manner as the top of the head, in vertex presentations, descends along the posterior surface of the pelvis, revolving upon the base of the occiput or the tracheal region of the neck in face presentations.

Notwithstanding that many excellent practical men have followed Mr. Douglass in describing this mode of delivery, yet it may be seriously agitated whether such a delivery is practicable when the fœtus is fully developed at term, and the pelvis of ordinary size, especially in primiparous labors. That, when the child is small and very flexible, as in cases of twins and premature labors, such deliveries may be accomplished, there can be no doubt, and sometimes even with safety to the child; but almost universally, even in such cases, the child has perished, from the delay and pressure to which it has been subjected, and the mother's life is greatly endangered.

Theoretically, evolution at the full period of uterogestation would seem to be impossible; inasmuch as the whole body of the child must be at one time in the cavity of the vagina, extending from the superior strait to the vulva—the breech being at the sacro-iliac symphysis, and the root of the neck at the symphysis pubis, a distance measuring, in a full-grown child, at least eight inches and six lines, which must be compressed between the sacrum and the pubis, in order to allow the descent of the breech.

Authorities very universally affirm that this mode of delivery occurs only where the children are small or the pelvis unusually large; in some instances evolution is said to have occurred at term, but few of these, as far as we have seen, can bear analysis. Many of these reputed cases were decided examples of version, that is, where the presenting part receded, and the breech or head eventually came down—constituting an alteration of the presentation. Velpeau, in his learned treatise, quotes cases as examples of evolution, many of which certainly do not come under the definition of this process as given by M. Velpeau himself—that is, a persistence in the original presentation, while other parts of the fœtus descend and pass out with it. He quotes a case from Schreiber, for example, in which the breast, belly, breech and lower extremi-

ties descended successively. It is evident in this case that there was no retention of the original presentation at the vulva, but that the child turned between the pubis and the sacrum—the sternum ascending behind the pubis, followed by the abdomen, until the pelvis was delivered. This was still more evident in the case detailed by Peu, where both arms appeared at the vulva, with the sternum behind the pubis, the child being delivered by the breech. Also in another by M. Ricord, who observed a child descending double into the pelvis, presenting its back; all attempts at artificial delivery failed. In a short time the breech descended and passed the vulva. This again was an alteration of presentation. M. Mazzoni mentions a similar case.

All these are truly cases of version, not in utero it may be, but in the pelvis; portions of the child turning from the vulva, behind the pubis, while the abdomen and breech descend posteriorly until a complete version is effected, and the child is delivered by the pelvis.

Dr. Denman's cases, which he unfortunately termed evolution, were really cases of version, as now defined. It does not appear clearly that he ever met with a case of evolution. With Dr. Churchill, therefore, we regard the criticisms of Douglass and others upon Dr. Denman as being unjust. Few authors, even to the present time, adhere strictly to the essential points of difference between these two processes. The practical importance of the distinction will appear under the head of treatment.

Although, therefore, the process of version is chiefly met with when the children are small, and before the membranes are ruptured, or soon after the liquor amnii has been evacuated, yet there can be no doubt that in some instances spontaneous version has ensued long after the membranes have been ruptured, and powerful contractions of the uterus have existed. Velpeau mentions an instance, in which a young woman was in labor with a shoulder presentation. He determined to leave it to nature, and after fifteen hours it was found that delivery occurred, the shoulder gradually having receded from the side opposite to where the head was, and the side of the head and the vertex descended into the pelvis. This was an example of spontaneous version by the vertex. Dr. Dewees mentions also a case at term where the shoulder receded, but in a direction toward the head, so that the child turned, and was born presenting the breech; this was spontaneous version by the breech. It should be remarked, however, that in this case of Dr. Dewees the child's tissues were softened by putrefaction.

As regards spontaneous evolution, there are few, if any decided cases upon record of this process, when

the child is well developed in the pelvis of a normal size at the full period of utero-gestation.

Dr. Robert Lee describes a case at the full period; but his patient was three days in severe labor, and the child was not delivered until putrescency had taken place, its head flattened, and its abdomen ruptured by the degree of pressure to which it was subjected.

It is evident, therefore, from the whole of this investigation, that although it is perfectly marvellous what may, in some few instances, be accomplished by the natural efforts of the mother, in presentations of the shoulder, yet they ought to be regarded as *impracticable labors*, resulting almost universally in the death of the child, and very generally, without artificial assistance, in that of the mother.

Fig. 76.



Dorso-Sacral Position of the Right Shoulder.

Dorso-Sacral Position.—In this position the head of the child will be found toward the right portion of the superior pelvis, while the breech will be toward the left; this has been termed, therefore, the right occipito-iliac position of the right shoulder, the spine of the child being posterior, and the abdomen anterior.

The *diagnosis* can generally be made out readily by the marks already designated, bearing in mind the observation, that the palm of the hand at the vulva being turned upward toward the pubis, the thumb will point to the right thigh of the mother, and the little finger to the left.

This position is said to be not so common as the dorso-pubic; but in other respects the phenomena of labor and delivery, if this should occur, are virtually the same. Generally, therefore, the labor is impracticable, the head and chest meeting together at the brim of the pelvis. If *spontaneous version* should

occur, the head, in this case, moves on the right, instead of the left iliac fossa. If *spontaneous evolution* should, however, take place, the rotation of the body in the superior pelvis will be in the opposite direction from the former position, the head now rotating from right to left anteriorly, and the breech of the child from left to right posteriorly; after which delivery, with the shoulder under the arch of the pubis, is effected precisely in the same manner as in the dorso-pubic position.

PRESENTATION OF THE LEFT SHOULDER.—Dorso-Pubic Position.—This resembles the dorso-pubic of the right shoulder in every material respect, excepting that the head of the child is now to the right, instead of the left side. And, of course, it is the left instead of the right side of the child which is forced into the pelvis. The *diagnosis* may be made in a similar manner, by recognizing that the top of the shoulder, as designated by the acromion process, spine of the scapula, and the clavicle, is now toward the right side of the pelvis, and the hand, when delivered externally with the palm upward, will now have the thumb toward the left thigh of the mother, and the little finger to the right. In this case the contractions of the uterus continuing, the lateral flexure of the neck and body is now upon the right side of the child, while any movements of the head, which occur in version or evolution, will be on the right side of the pelvis, and not on the left, as in the former presentation.

Dorso-Sacral Position.—This position necessitates that the head should now be toward the left iliac fossa, and the breech toward the right; and hence the movements of the head will now occur on the left side of the superior pelvis, and not upon the right, as in the sacro-pubic position, when spontaneous version or evolution are manifested.

Frequency of Trunk Presentations.—We are informed by Dr. Churchill, that in British practice they occur once in every two hundred and fifty-two and a half deliveries; and in French practice, once in every two hundred and eight and a half deliveries. Comparatively few cases are reported by modern accoucheurs of any other presentations of the trunk than that of the right or left shoulder; nevertheless, we have seen that, in a few instances, there may be presentations of the anterior or posterior portions of the fœtus. Many authors, also, under the expression of deviated presentations of the vertex, have mentioned presentations of the nucha, or nape of the neck, while under that of deviated presentations of the breech, we read of presentations of the sacrum, of the thighs, or

of the right or left hips. These, however, are of little importance, as they very universally disappear as soon as the contractions of the uterus are in full exercise.

Madame Lachapelle informs us that dorso-pubic positions are more frequent than the dorso-sacral.

Trunk presentations are said, also, to occur more readily when the pelvis is deformed, when the child is premature, and also when there are twins or triplets.

Prognosis.—Judging from statistics, this has been very unfavorable to the child, and even to the mother, who has frequently perished. Thus Dr. Churchill states that fifty-five per cent. of the children are lost, and ten and a half per cent. of the mothers. Let it be remarked, however, that much of this fatality arises from the fact that the accoucheur has not been called, in many instances, until powerful bearing-down efforts have been for a long time present, and the child greatly compressed in its unnatural presentation. Much, also, depends on the neglect or incapacity of the practitioner to operate early before the liquor amnii is completely drained off; and, finally, numerous unfortunate results have been the consequence of waiting for spontaneous version or evolution. The indefinite rules or principles given for the treatment of these terrible complications of labor have added to the list of unfortunate cases.

Treatment of Trunk Presentations.—The exhibition which has been now given of the history of trunk presentations will, it is hoped, elucidate in some degree this difficult subject. We perceive their dangerous character, and also what attempts are made by nature to effect delivery; we notice also how comparatively seldom such attempts are successful, and that very generally the mal-presentation is persistent—the child, and even the mother perishing. Nevertheless, this study of nature's effort evolves the proper principles for scientific practice. Nature lays down, as it were, the indications which it is the supreme duty of the scientific accoucheur to fulfil. Following out, therefore, these indications, practitioners of late years have been far more successful than their predecessors, and we have no doubt that when proper principles are still better defined and acted upon, the dreadful mortality which we have recorded will be exceedingly diminished, and at least the important life of the mother will be very generally preserved.

The treatment of trunk presentations will be comprised under that of presentations of the shoulder, inasmuch as the practitioner will seldom meet with any others, and the principles involved are precisely similar in all presentations of the body of the foetus.

Treatment of Shoulder Presentations.—The disposition to version which is not unfrequently manifested

before the membranes are ruptured, and sometimes after the waters have drained off, has already been detailed. The practitioner should never forget this important fact, and this natural predisposition must be the foundation of all proper treatment for shoulder presentations, and should be *facilitated* by every measure at the command of the accoucheur; or be actually performed by him, where the uterine powers, unassisted or assisted, are inefficient.

Version may be made, first, during the last periods of utero-gestation; second, at the commencement of labor, before the membranes are ruptured; third, soon after the waters are evacuated; and, fourth, when the uterus is powerfully contracted and the foetus encased or locked up in its cavity, with a shoulder or arm protruding from its orifice.

I. *During the latter periods of utero-gestation.*—Of late years it has been suggested that as so many difficulties and dangers ensue in trunk presentations, much attention should be paid to all women during the latter three months of gestation, to determine the presentation of the foetus and to rectify all that are unnatural. Dr. Mattei, of Corsica, is an enthusiastic advocate for this practice, advising its employment as early even as the sixth month of utero-gestation. He would recommend “external manipulations” by the hands upon the abdomen, and even by bandages, so as to diminish the transverse, and increase the longitudinal diameter of the uterus, after rectifying any obliquity. By these measures the coccygeal or vertical extremities of the foetal ellipse may be gradually determined to the superior strait.

M. Wigand, however, who revived this practice of external manipulation in 1812, Velpeau, who practiced it in 1835, and Cazeaux, and others, deem all such attempts unadvisable, if not positively injurious. The objections are obvious.

First. The necessity, if such practice should be deemed requisite, of frequent examinations during the latter months of gestation, in order to determine whether a mal-presentation of the foetus exists, would be perfectly abhorrent to the delicate sensibilities of a cultivated woman.

Second. It would be generally useless, as diagnosis would be always difficult and often impossible before labor has commenced.

Third. Such mal-presentations, it is well-known, often spontaneously disappear, during the last periods of gestation, and also after the commencement of labor.

Fourth. These external manipulations may produce irritation. This may be so great as to excite uterine contractions and bring on premature labor, often with the loss of the infant. It is possible also that inflam-

mation may be excited in the uterus, ovaries, peritoneum, or other tissues, involving the welfare and life of the woman; and,

Fifth. The practice would generally be inefficient, and at best uncertain: for if the practitioner should succeed in converting the mal-presentation, he can have no guarantee that it would not return; for the child is still movable in the liquor amnii.

Version, therefore, during the latter periods of gestation should not be undertaken.

II. *During the first stage of labor and before the membranes are ruptured.* If, by examinations externally or internally, it can be ascertained at the commencement of labor that there is a trunk presentation of the fœtus, judicious attempts may be made to rectify it by the scientific accoucheur. Let it be supposed, for example, that there is a dorso-pubic position of the right shoulder; the head can be felt at the left iliac fossa, and the breech to the right side. Under these circumstances the patient should be placed upon her left side, toward which the head has deviated. This position will have a tendency to rectify any right lateral obliquity of the uterus. This rectification of the uterus and of the fœtus will be still more facilitated by the left hand of the practitioner placed over the right and superior portion of the uterus, so as to press the fundus toward the left side, while his right hand may determine the head of the child from the left iliac fossa toward the centre of the pelvis; the child being still movable in the liquor amnii, may be thus changed from a transverse or oblique position into a direct one, its axis becoming parallel to that of the superior strait. If this be effected, the membranes should be immediately ruptured, so that the contractions of the uterus may fix the child in this rectified position.

It has been recommended by M. Cazeaux that a thick and hard pillow should be placed under the side of the abdomen where the head is located, so as to facilitate the manœuvre just described.

The same principles should regulate the manner of operating in all the variety of trunk presentations, including not merely those where the head is toward the lower part of the uterus, but also those where the head is superior, and the breech has deviated from the superior strait.

Numerous practitioners have testified to the success of this practice in those few cases where the mal-presentation has been recognized prior to the escape of the liquor amnii. Our friend, Dr. Meigs, among others, has detailed a case where he succeeded in determining the head from the iliac fossa to the os uteri, and in securing this favorable presentation by piercing the

membranes so as to permit the escape of the liquor amnii, and bring on the contractions of the uterus.

The advantages of this alteration of the presentation are perfectly obvious; all the dangers to mother and child of a shoulder presentation are at once obviated, and the case reduced to one of natural labor. This is accomplished also by measures which are very simple and ought never to be productive of mischief.

The correction of the presentation by *external manipulation*, although not entirely neglected by older authorities, is comparatively a novel practice. It has been sustained by many experienced men in Germany, France, Britain, and America, but is still by no means an established practice, even under the circumstances just detailed.

It has been almost universally recommended to wait patiently for the dilatation of the os uteri, keeping the patient quiet, in a recumbent position, and forbidding any bearing-down effort, so as to preserve the integrity of the ovum. As soon, however, as the os uteri is dilated or dilatable, the practitioner should pass his hand into the vagina, rupture the membranes, push up the presenting part, and immediately proceed to bring down the feet, and thus effect a pelvic delivery.

Perhaps every one will readily bear testimony to the facility with which the operation of *podalic version* can be accomplished, in most cases, under these circumstances; the child and the mother generally doing well. This is true, also, very usually, even if the membranes have been ruptured for a short time before this manual delivery is undertaken.

The objections to this operation are,

First. The pain of introducing the hand, especially in primiparous women, through the vulva, and, in all cases, the suffering and irritation excited by the hand at the os uteri and in the cavity of the uterus.

Second. The occasional difficulty of reaching the feet.

Third. The fact that sometimes, even in these favorable cases for version by the feet, the child may be lost.

Fourth. The danger of uterine lesion.

Nevertheless, if the operation be timely performed, these objections are not serious; and as the whole labor can thus be rapidly completed, and with great prospect of success, it still receives the countenance of the great mass of the profession. It certainly should never be delayed for any length of time after the os uteri is dilated.

We, however, can perceive no reason why both plans—external manipulation and version by the feet—may not be attempted, perhaps in the same case of labor. The former should be resorted to in all cases where a mal-presentation has been detected at the commencement of labor, and may be carefully persisted in

until the os uteri be dilated; if not then successful, it should be immediately abandoned, and podalic version be performed. In this way, under an attentive accoucheur, there will be no unnecessary delay or risk, and the patient might reap all the advantages of version by the vertex.

III. *During the second stage of labor*, that is, after the os uteri is more or less dilated, the liquor amnii evacuated, and powerful contractions of the uterus have ensued.

The case now becomes urgent. The flexibility of the child is so great, especially as regards its neck, and the bearing-down efforts so powerful, that the fœtus is very universally bent upon itself; that is, the shoulder is pressed into the os uteri, while the head, by a lateral flexure, is bent toward the chest, so that the child is virtually "doubled"—the head and chest being forcibly impelled against the orifice of the uterus and the brim of the pelvis. In a few minutes, the malpresentation may be firmly fixed. Hence, the practitioner should be upon the alert, and immediately determine upon and execute a plan for artificial delivery. To wait for "spontaneous version" is unjustifiable; it would risk very generally the life of the mother, as well as of her infant.

At this juncture *version by the feet* is very universally recommended. The difficulty of execution, however, is great, arising from the escape of the liquor amnii, the impaction of the child in utero, and the almost constant contractions of the womb. If labor be prolonged, it will be almost impossible to reach the feet, and sometimes even to introduce the hand without danger of contusion or laceration of the uterus, or of producing severe irritation, which may be followed by dangerous or even fatal *metritis*.

Dr. R. Lee mentions that out of seventy-one cases of version by the feet, ten of the mothers perished; seven by rupture of the uterus, and three from subsequent inflammation. Of these seventy-one cases, fifty-five were delivered by the hand, three by spontaneous evolution, one by evolution assisted by traction, and twelve by perforation and the crotchet. This melancholy statement, from a very distinguished London practitioner, is enhanced by the fact that it would seem that in a large number of cases version was resorted to early.

Version by the feet, under these circumstances, is very dangerous to the child. Statistics represent version, under all circumstances, as fatal to the infant at least once in three times; but under these cases of uterine contractions, the fatality is much greater.

Doubtless, many of these dangers are aggravated by the ignorance, by the want of skill, or by the rashness of the practitioner. They may be greatly diminished,

not merely by the timely performance of the operation, but especially by the skill and dexterity with which it is executed. Much also depends on the state of the patient, whether she be strong or weak, whether she be excited or composed, whether she has been but a short time in labor, or whether she has been prostrated by long and unavailing efforts. Much may also be done by way of preparation. If the patient be strong and plethoric, free venesection may contribute greatly to diminish vascular excitement, and especially to favor relaxation of the uterus; nothing is so effectual. Dr. Dewees would recommend it to be carried even to faintness. Where bleeding cannot be resorted to, practitioners have recommended warm baths, warm fomentations, diaphoretics, and especially nauseating doses of ipecacuanha, tartar emetic, etc. These measures may be assisted by narcotics, especially by the free exhibition of preparations of opium, either by the stomach or rectum. These serve not only to diminish the sufferings of the patient, but also to moderate uterine contractions, and thus facilitate the introduction of the hand into the uterus.

In such cases, however, *anæsthesia* has proved to be a great blessing. The use of ether or chloroform is certainly of inestimable value to humanity, particularly as regards surgical operations; and to Professor Simpson, of Edinburgh, we must be very grateful for its introduction into the practice of obstetrics. Whatever objections may be urged to its employment in ordinary cases of labor, certainly in the case of version in a contracted uterus, there can be no objection to complete anæsthesia. By it, suffering is destroyed, the uterine contractions are suspended, or at least diminished; there is also, of course, a comparative relaxation of the cervix and body of the uterus, thus in every way facilitating the introduction of the hand, and the "mutation" of the child with the least possible risk.

In performing podalic version, it not unfrequently happens that in the same presentation one hand will be preferable in one case, and the opposite in another case, arising from some special complication depending upon the position of the woman, the convenience of the accoucheur, or the particular direction in which the hand must be passed. The general rule laid down by M. Cazeaux and other experienced accoucheurs, is doubtless the best—to employ the hand of the same name as the presenting shoulder; thus, the right hand is to be employed in each position of the right shoulder; the left in those of the left shoulder. Hence,

In the dorso-pubic position of the right shoulder, the right hand is to be introduced into the cavity of the pelvis, the shoulder is to be removed anteriorly, and to the left, so that the hand may pass over the

anterior surface of the child to the left lower extremity, and, if possible, also over the right, bringing the thighs, legs, and feet downward, along the abdomen of the fetus into the vagina. Traction effort made on the extremities will cause the body to rotate slightly upon its axis, and the breech will be brought down in the right sacro-anterior position.

In the dorso-sacral position of the right shoulder, the right hand being introduced, the shoulder should be moved somewhat posteriorly, and to the right, while the hand must be carried between the pubis and the abdomen of the child, so as to embrace the lower extremities, that the breech may be brought down in the left sacro-anterior position.

In presentations of the left shoulder, the left hand is to be employed, and the manœuvre executed in a similar manner.

This operation of version, in cases of contracted uterus, should be performed with the greatest possible care. Intelligent assistants should support the uterus by external pressure, so as to diminish the danger of rupturing the vagina during the operation. The hand should be moved onward only during an interval of pain; when contractions occur, it should be kept quiet, and the fingers spread upon the body of the child, and no forcible efforts should be made to grasp its extremities, as dangerous contusion or laceration would result; the hand had better be withdrawn, and other measures be adopted. Patience and perseverance will often, however, accomplish much, and the child may sometimes be preserved, even when the circumstances are very unfavorable.

Contemplating the difficulties and dangers of turning by the feet, in these cases, learned accoucheurs have often advised, and occasionally attempted, with some success, *version by the vertex*, according to the mode formerly directed.

All, however, acknowledge the difficulty, and frequently the impossibility of removing the shoulder, and bringing down the vertex to the centre of the pelvis. Most authorities, also, condemn the practice as wasting time to such an extent, that even podalic version could not afterwards be employed.

Dr. M. B. Wright, of Cincinnati, in a valuable paper published in 1850, recommends another mode of operating, which is certainly very simple, safe to mother and child, and, according to Dr. W., very successful.

It consists in rectifying the obliquity of the womb, by placing the patient in the proper position, and by suitable pressure toward the upper and lateral portions of the uterus. The hand of the practitioner should then be introduced into the vagina, and the fingers be directed over the acromion process to the root

of the neck, and the thumb under the axilla against the ribs. Then, during the absence of a pain, the shoulder, through the medium of the fingers acting upon the clavicle and scapula, assisted by the thumb on the ribs, is to be pushed obliquely upward, and in a direction opposite to where the head is placed. Thus, in a dorso-pubic position of the right side, the shoulder should be directed upward, and toward the right iliac fossa, while the left hand, on the abdomen, presses the fundus of the uterus, and, of course, the breech of the child toward the left lumbar region; thus greatly facilitating the rectification of the fetus, and the descent of the vertex into the superior strait. Should the arm be prolapsed, it is advised to re-introduce it, and carry it, as far as practicable, toward the breast of the child.

Dr. Wright declares that this manœuvre has, in his hands, been always successful. It is certainly a very ingenious and scientific suggestion, very creditable to the author, and deserving the serious attention of every accoucheur. In its performance, little or no pain would be inflicted upon the patient, there would be no risk of contusion, laceration, or irritation of the vagina or uterus, and no possible injury to the child. On the contrary, it would afford the infant the best chance of escaping in safety from its perilous position, and not enhance the dangers to the parent.

Dr. Penrose has published, in the American Journal of the Medical Sciences, January 1856, a case in which he acted upon the suggestion of Dr. Wright. It was a labor of twins; one child having been successfully delivered at 2 P.M., under the care of a midwife. The second infant presented the left shoulder in the dorso-pubic position. At 7 P.M. Dr. P. was called, and attempted, unsuccessfully, version by the feet. He then operated upon the shoulder, directing it from the right toward the left side of the pelvis; at the same time, by a hand over the right iliac fossa, the head was determined toward the superior strait. Version by the vertex was thus accomplished, and, after some further delay from inaction of the uterus, the child was born alive.

Experience must yet, however, determine the feasibility of this method. Can a sufficient pressure be made on the shoulder, which is so movable upon the chest as to determine, in all cases, the rotation of the body in utero, and the descent of the head firmly fixed in the iliac fossa, or upon the ramus of the pubis? Of course, the sooner the operation be undertaken the more easily can it be effected; but Dr. Wright affirms that, even when contractions have long existed, it has, nevertheless, been successful, sometimes after an attempt at version by the feet has failed. The relative

number of infants saved by this manœuvre has not been stated.

IV. *When the uterus is powerfully contracted, and version by the vertex or feet cannot be accomplished by the modes already designated.*—These are most deplorable cases, and too often fatal to the mother, and very universally destructive to the infant. Indeed, such cases presuppose the death of the child; for, as long as the child is living, the hope must be entertained that version may possibly be accomplished by the hand. Under the circumstances now contemplated, several distinct modes of delivery are presented to the consideration of the accoucheur:—

First. To wait for "*Spontaneous Version.*" This was the advice given by Dr. Denman as the result of his observations on the efforts occasionally made by nature, with some success, to accomplish delivery. This advice has been too frequently followed, for melancholy experience has proved that when the head and thorax have been long engaged at the superior strait, under powerful bearing-down efforts, little or no tendency, in most cases, has been manifested for version; if unassisted, the woman perishes from exhaustion or laceration of the vagina and uterus. We have no hesitation in declaring that no time should be lost in waiting for any spontaneous change; every minute enhances the danger to the mother.

Second. "*Spontaneous Evolution.*"—Since the description of this natural mode of delivery under peculiar circumstances has been published by Dr. Douglass, practitioners have felt justified, in many instances, in waiting, under the hope that this singular mode of delivery could be accomplished.

If, however, the opinion already given, that a child at term cannot be delivered in this mode without the greatest possible risk to the integrity of the mother's organs, and even to her life, be correct, no man will be justified in trusting the important life of the parent to her own unaided efforts. Artificial delivery should be immediately resorted to.

Nevertheless, as many cases are upon record where spontaneous evolution has occurred and delivery been accomplished with safety to the mother and occasionally to the child, owing to the comparatively small size of the infant, the practice of waiting for spontaneous evolution is not always to be condemned. Should, therefore, the practitioner be called after the shoulder has descended into the cavity of the pelvis and rotated under the arch of the pubis, and when the contractions are powerful, and the body evidently descending through the pelvis, it will be right to allow the labor to proceed undisturbed, watching carefully its progress and the effect upon the tissues of the parent.

The author has never met with a case of "spontaneous evolution." He would, however, venture the suggestion, that the practitioner, having acquainted himself with the mechanism of labor, and also with the peculiarities of the case, should not be any idle spectator, but by proper manipulations with his finger against the body of the child, and also externally against the perineum, he might greatly *facilitate* this desired evolution, and do much to prevent mischief to the mother.

Perhaps it even would prove advantageous to depress the apex of the shoulder under the arch of the pubis, and direct it within the pelvis, so as to allow it to rise up within and behind the pubis, and thus afford room for a proper "*version*" in the cavity of the pelvis. This would be to convert the process of "*evolution*" into that of "*version*." The child then would be delivered not by its side but by the breech—it would be version by the breech. This certainly, if it could be accomplished, would be far safer for the infant and for the parent than to have the whole length of the body of the child crowded between the pubis and the sacrum.

Artificial Delivery.—Experience proves that, in some instances, neither version nor evolution will occur spontaneously, and where they cannot be effected safely by any manœuvre, the mother must perish without instrumental assistance. The child has by this time perished, and, of course, requires no consideration on the part of the practitioner; for, as Dr. Dewees would observe, "we must keep no terms with it."

Although this be true, yet practitioners have unfortunately been left too much to the suggestions of the moment to accomplish the delivery of the child, without being guided by any fixed scientific principles. We think, however, that principles for surgical delivery in these bad cases of shoulder presentation can be as clearly established as for any other obstetric operation. They are founded upon the fundamental law, that one or other extremity of the foetal ellipse should descend first into the cavity of the pelvis. We have seen that, in shoulder presentations, the execution of this law, although generally impossible by the mother's efforts, nevertheless is always attempted by nature; in other words, there is a natural tendency in all shoulder presentations to version by the vertex or by the pelvis. This law must always be regarded as the foundation of scientific treatment. All attempts, therefore, made by traction on the arm, by sharp or blunt crotchets, to bring down the body of the child double, are unscientific, exceedingly dangerous to the mother, and very generally ineffectual. *Artificial version by the head or breech* should be the great object of the accoucheur.

We will suppose that the former has been attempted by external and internal manipulation, but that it has failed.

Third. *Artificial version by the breech*.—There are two modes of operating to bring down the breech, either of which may be adopted, according to the circumstances of the case, and both of which the author has employed with success.

The first mode will be illustrated by the details of the following case:—

The author was called in consultation to a woman in labor with twins. The first child being delivered safely, occupied for a few moments the attention of the practitioner; during this period a most violent contraction of the uterus occurred, and, upon examination per vaginam, an arm of the second child was found in the pelvis, and the side of the thorax and shoulder presented at the superior strait. Failing in his attempts at version by the feet, the assistance of the author was requested. On arrival, about two hours after the delivery of the first child, the arm and the umbilical cord were found in the vagina; the hand was passed up into the uterus sufficiently far to recognize that the head, owing to the great lateral flexure of the neck, was in contact with the thorax, and that the lower extremities could not readily be found. It being evident that the child was dead from the pulseless condition of the cord, and the uterus being powerfully contracted, it was deemed inexpedient to persevere in this manual attempt. After some reflection it was determined to perforate the side of the child near to the lower part of the thorax. Through this opening the small blunt hook was passed, and forced down among the viscera to the pelvis of the child, on the sides of which it was firmly fixed. On making a traction effort downward, and carrying the handle of the instrument obliquely to the side opposite to where the pelvis was situated, there was no difficulty in causing the descent of the breech, and, of course, the ascent of the head and shoulder on the opposite side of the pelvis and uterus. The whole body of the child, revolving within the uterus, so that the breech soon appeared in the cavity of the pelvis, and the hook being removed from the body, the further delivery was readily accomplished.

By means of the hook thus carried into the pelvis of the child, we create version by the breech, precisely as nature sometimes accomplishes it, in the manner so accurately described by Dr. Denman.

We perceive no objection against the operation; when properly executed, it is simply upon the body of the child, and the traction effort being made directly downward, there is no danger of laceration of the vagina or of the uterus. Indeed, there need be no contusion

even of these tissues. The theoretical objection that there is no room in the uterus for the ascent of the head is not valid; for the traction which displaces the breech of the child, makes room for the head; and as the whole body immediately descends somewhat into the pelvis, there is no necessity for any enlargement of the womb, and no danger of laceration of the vagina. The foetal ellipse revolves upon its transverse axis, the head approximating the fundus, as the breech descends and approaches the centre of the pelvis. It is an operation, therefore, perfectly safe, and in full accordance with nature's law, of which it is an imitation.

The second mode by which this version by the breech may be accomplished is, by passing a blunt or sharp crotchet externally, (Plate XXXII., Fig. 157,) under the direction of the hand of the practitioner, along the body of the child to the pelvis, where the point can be fixed on the pubic or sacral regions, according as the instrument is directed on the anterior or posterior portions of the child. When thus fixed, traction effort may be made, while the shoulder and thorax may be pushed up by the fingers, so as to assist the version of the foetus. A few months since delivery was thus effected by the author, in a case of a dorso-pubic position of the left shoulder, where much difficulty existed, as the patient was a young girl in her first labor. No bad consequences ensued. In some instances, where the pelvis is very high in utero, and where the crotchet cannot be readily carried to the desired point, it may be fixed toward the lower part of the abdomen or spine, and thus some traction can be made; afterward it can be carried further so as to fix it upon the nates or the ligaments, or bones of the pelvis, so as gradually to produce version.

The important principle, which we have enunciated, that version by the breech should be undertaken, in a large number of cases, by the crotchet, when the child is dead in utero, has never been distinctly inculcated by authors. Most writers content themselves with saying that, if manual assistance be impracticable, embryotomy must be resorted to; others, that the crotchet may be employed, but give no specific direction; others, again, as Dr. Robert Lee, that the shoulder should be removed, the thorax opened, the viscera extracted, the hook applied, and the child be delivered "double," as in cases of evolution. Others, that traction effort should be made upon the arm, "using it as a lever." M. Parmat, as reported by Cazeaux, advises to perforate the chest, fixing the crotchet on the ribs, and then, by traction, cause the body to revolve, and thus to be delivered, as in cases of evolution. Dr. Leed, of London, reports that in 1814, and subsequently, he delivered patients, by removing the arm, and perforating the thorax, into which



Fig 155

4th position of Base of Head
Occiput brought down



Fig 156

4th position of Base of Head.
Occiput brought down.
Forceps applied.



Fig 158.

Hydrocephalic Head

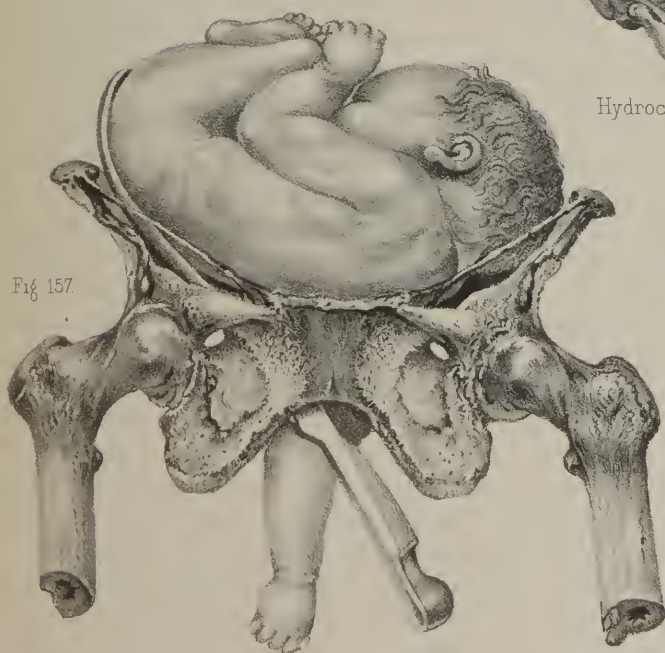


Fig 157.

Presentation of Shoulder
Version by the Breech,

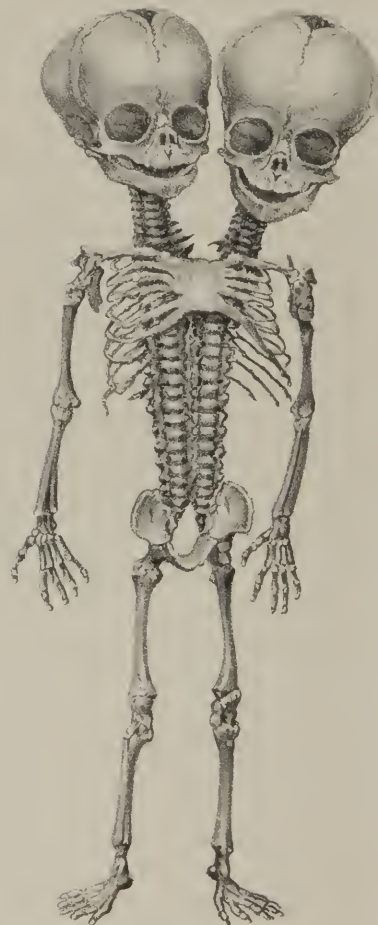


Fig 159

Bicephalic Foetus.

he directed a blunt hook, which he fixed on the lower part of the spine, and by steady traction effort delivered the children "double." Drs. Churchill and Collins say we should never wait for spontaneous change, but should eviscerate the chest and deliver by the crotchet.

These are the indefinite directions given by the best authorities in obstetrics as regards instrumental delivery, in cases of shoulder presentations. One important exception to this remark will be presently noticed.

That the child, owing to its great flexibility, may be delivered "double" by the sharp or blunt hook, fixed upon the spine, especially after the viscera have been removed, there can be no doubt. It is manifest, however, that all attempts to finish labor, in these unfortunate cases, by fixing the hook upon the spine of the child, are "unscientific"—they are not founded upon nature's fundamental law, *that one or the other pole of the fetal ellipse should descend first through the pelvis*. Version by the breech should be the great object of the practitioner; when not to be effected by the hand, it should be attempted instrumentally. When the foetus is drawn down double, delivery will often be impracticable, the mother perishing before the object can be attained. In other instances, severe contusion or laceration of the tissues will be the consequence, which may sometimes also prove fatal; and although, in some instances, her tissues may escape lesion, yet delivery is accomplished under great suffering, and with enormous and dangerous distension of the vagina, perineum, and vulva.

On the contrary, if a hook can be implanted on the pelvis of the infant, the revolution of the foetus will be easily accomplished, with little or no risk to the vagina or uterus, and the subsequent delivery be effected as readily as in an original pelvic presentation.

Another incidental advantage of some importance, is the slight mutilation of the infant; a point which should never be disregarded by the humane practitioner, who pays a proper regard to the warm sensibilities and fervid imagination of the mother and her friends.

If the practitioner should not be called until after the process of evolution has considerably advanced—the shoulder being under the arch of the pubis, and the contractions of the uterus still vigorous—he should, so long as the child is alive, endeavor to return the shoulder into the pelvis, so that the process of version may be substituted for that of evolution.

Fourth. *Artificial Evolution*.—When the child is dead, some practitioners have succeeded in facilitating *evolution* by throwing a fillet over the body

of the child, by which traction may be made; others have made traction by the arm; others have fixed the crotchet upon the body, or, as Chailly recommends, even upon the pelvis of the infant, and thus materially assisted in compressing the body of the child in the cavity of the vagina and accomplishing delivery. Others, exercising more judgment, have opened the chest, eviscerated the thorax, and then, by a hook, applied successively to the thorax, the abdomen, and, finally, to the pelvis, greatly diminished the sufferings of the patient, and facilitated the expulsion of the foetus.

Although the author has not met with a case of this kind, he would venture the advice, that even in the cavity of the pelvis, *version* is to be preferred to *evolution*. Therefore, the first step in the operation of embryotomy, in these cases, should be the complete removal of the arm and shoulder, including the whole scapula, and perhaps even the clavicle. This could be effected without any difficulty, as the arm is external, and the shoulder at the vulva. This having been accomplished, there will be then no obstacle to the ascent of the side of the thorax behind the pubis. The thorax should be now opened, and, if necessary, the side of the abdomen; the crotchet should then be passed into the body, and fixed on the pelvis of the infant. Traction effort, now made, will readily cause the descent of the breech, and the ascent of the thorax behind the pubis; so that the whole body would revolve on its transverse axis in the cavity of the pelvis, and the child be delivered by the breech at the vulva. In other words, the process of evolution will be superseded by that of version.

The advantages to the mother are apparent. Comparatively little effort by the practitioner will be required, and, of course, there is little or no increase of suffering to the mother, and the danger of contusion or laceration of her tissues will be lessened; the child will present simply the breech at the inferior strait and os vaginæ, instead of having its whole body, from the root of the neck to the tubers of the ischii, compressed between the pubis and the sacrum, necessitating an enormous distension of the orifice of the vagina and of the perineum, with the most imminent danger of contusion or laceration.

Fifth. *Decapitation or Detruncation*.—Amidst the multiplied difficulties and dangers incident to presentations of the shoulder, especially where the child is very large, or the pelvis contracted, there may be cases where it will be almost impracticable to adopt either of the operations now indicated. There is still another resource for the practitioner, by which the life of the mother may be preserved. It consists in divid-

ing the neck of the infant, when delivery can be readily accomplished, first, by bringing down the body, and, subsequently, the head.

This is an ancient operation, having been adopted by Celsus and others, when the science of obstetrics was little understood. It has been revived in modern times, and has been especially recommended by Ramsbotham, Sr., Cazeaux, Van der Ecken, and other accoucheurs.

Two modes of operating have been suggested: the first is, to pass a hand into the pelvis, and turn the fingers over the neck, or, what is far better and more easy and efficient, to direct a large, blunt hook over the neck of the child, by which steady and gentle traction can be made, so as to depress the neck as much as practicable, and render its tissues tense. The hook, now, being delivered to an assistant, the operator should direct the blunt-pointed craniotomy scissors, (Plate XVI. Fig. 88,) under the guidance of the fingers of the left hand so as to protect the tissues of the mother, to the neck of the child, and then, by small and frequent incisions, completely divide its tissues. The blunt hook will now be liberated. The practitioner will find no difficulty, by means of his hand, or of a blunt hook, in bringing down both arms externally, upon which traction effort may now be made. This will have the effect of drawing down the scapula, and, thus, diminishing the size of the chest; the whole of which will then readily descend, followed by the breech and extremities, the head affording no obstacle to the passage of the body, inasmuch as it glides above the superior strait.

If, from any complication, traction by the arm should not be sufficient, the crotchet may be introduced into the chest, and fixed upon the ribs; or, if necessary, by means of the craniotomy scissors, sections of the ribs could readily be made, so as to diminish the size of the thorax. After the delivery of the body, the head should be removed, *secundum artem*, by means of the hand, the forceps, or the crotchet,—care being taken that it be brought down with the chin or the occiput presenting.

The second mode of delivery, more especially recommended by Dr. Ramsbotham, Sr., is to depress the neck by a blunt hook, as already described; then, to pass his decapitator, which is a blunt hook with the under or concave edge sharpened, over the neck of the child, carefully protecting the tissues of the mother by the fingers of the left hand. When properly placed, the sharp edge of the hook is in complete contact with the neck, and the practitioner can feel the blunt extremity on the opposite side. A saw-like motion being given to the instrument, and traction being at the same

time made, there will be no difficulty in effecting a division of the neck.

Fig. 77.



Ramsbotham's Decapitating Hook.

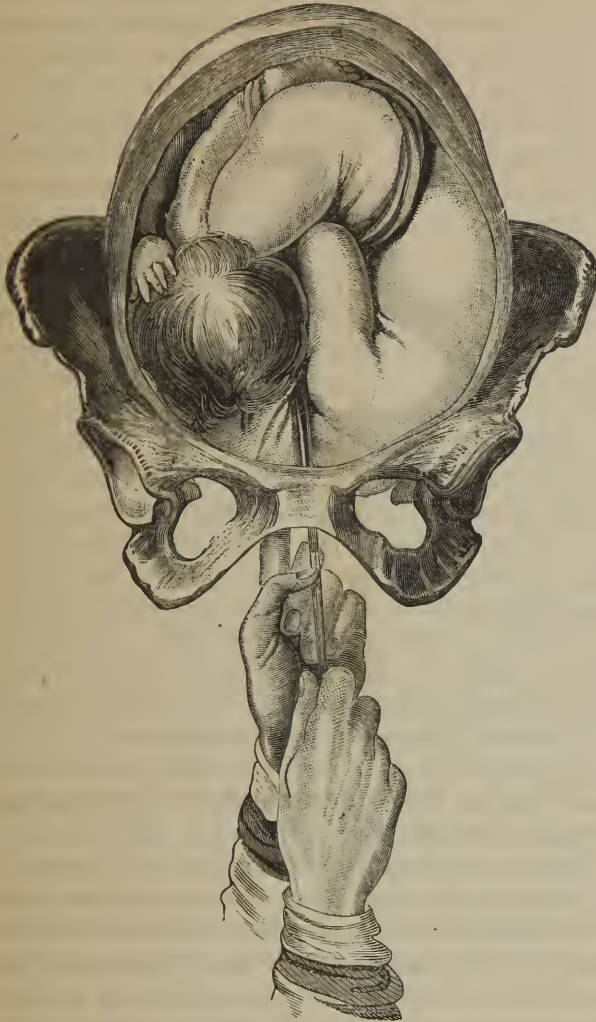
M. Van der Ecken recommends, for a similar purpose, a chain-saw.

This operation of decapitation can very generally be executed, although always attended with some difficulty. The author has operated in several cases successfully. M. Cazeaux states, that it is sometimes impracticable. Dr. Collins is opposed to this mode of operating, preferring evisceration and the use of the crotchet. Dr. Davis advises perforation of the body and its evisceration, and then the division of the dorsal or lumbar vertebrae. This may sometimes succeed; but, evidently, there might be troublesome interference of the two portions of the foetus when extraction is attempted. Decapitation has, certainly, the strong recommendation of being perfectly consistent with the fundamental law so frequently inculcated, of bringing down the foetus with its long axis corresponding to that of the pelvis. When the head is removed, this law can be accurately fulfilled.

The treatment of the arm in trunk presentations formerly absorbed much attention, as it was erroneously supposed that its presence was the cause of the whole difficulty. The most absurd practice, not worthy to be recorded, was instituted on this supposition; the only question agitated at the present day is whether

the arm should be entirely neglected, or whether in some cases it should be removed.

Fig. 78.



Operation of Decapitation.

If the child be *alive*, no consideration whatever should induce the practitioner to operate on this member. In such cases, therefore, a fillet should be applied to the wrist, simply for the object of preventing the arm from receding too far into the uterus in case of version, and of giving it a proper direction when the descent of the body should occur.

If the child be *dead*, the question of amputation of the arm may be agitated. It is very universally asserted that the arm needs no attention, upon the plea that it does not complicate the delivery, and should therefore not be removed, as a mutilation of the infant should be avoided, for the sake of its parents, as much as possible.

To this advice, as a general rule, we have no objections; nevertheless, where there is a prospect of *version*

by the pelvis, either naturally or artificially, and such mutation does not readily occur, the removal of the clavicle and scapula would materially facilitate the ascent of the head and thorax, and the consequent descent of the breech. Where there is deformity of the pelvis, or great rigidity of the os uteri, this removal would be very important.

Even in cases where version by the head takes place, the amputation of the shoulder would aid the delivery, inasmuch as it would prevent any delay, from the head and arm being simultaneously engaged in the pelvis.

In cases of evolution of the foetus, the opinion has already been distinctly expressed that the removal of the shoulder would greatly diminish the difficulties and dangers of the delivery.

By reference to what has been stated above, it will be found that this practice has been countenanced by many practitioners; Dr. Robert Lee always recommending that the shoulder be removed before evisceration and the crotchet be resorted to.

It will be unnecessary to give any special directions as to the management of the *dorso-sacral position of the right shoulder*, or of either of the positions of the left shoulder. The same general principles are applicable to all shoulder presentations.

PRESENTATIONS OF THE HEAD AND ARM. — It occasionally happens, especially where there is a large quantity of the liquor amnii, that on rupture of the membranes, the hand, and sometimes one or both arms of the child, may descend with the head, through the os uteri and superior strait, into the vagina. This accident no doubt arises, in most instances, from a powerful contraction of the uterus occurring at the moment when the head of the child, in consequence of the quantity of liquor amnii, or some obliquity of the uterus, does not completely occupy the cervix, affording room, therefore, for the descent of the hand, and the sudden discharge of the waters.

Although the *diagnosis* is not difficult, the practitioner, knowing that such accidents may occur, should, in all cases of labor, make a careful examination of the whole circumference of the presenting part, to ascertain if this complication exists.

If a hand or arm be detected, by an accurate examination of its anatomical peculiarities, so as to distinguish it from a foot or leg, it must not be inferred that a shoulder presentation is indicated; but the examination should be immediately prosecuted so as to determine at once whether it be a cephalic or trunk presentation.

This complication, even when the arm itself has

descended, is not of a serious character, although it causes delay, increased suffering, and of course anxiety

Fig. 79.



Presentation of the Head and Arm.

to the mother, and may possibly be attended with some injury to the tissues of the arm from pressure; or, if the head be comparatively large, or present unfavorably, the welfare of the child may be occasionally involved. The author has met with one case in which the woman delivered herself spontaneously.

Spontaneous deliveries may occur even when both arms descend with the head; but, of course, it increases the difficulty, and if the head be large, or the passages be small, labor may be impracticable. Dr. Simpson mentions a case where the fore-arm was behind the neck of the child, and thus prevented the descent of the head. Although he succeeded in bringing the arm to the breast, yet version by the feet became necessary for the safety of the fœtus.

The frequency of this complication is not great, as according to Mesdames Lachapelle and Boivin, it occurred but once in twenty-five thousand three hundred and one deliveries. Although this statement may be true as regards the descent of the whole arm with the head, yet it is not very uncommon to recognize the fingers, or even the hand of the child at the os uteri, in presentations of the head after the rupture of the membranes.

Treatment.—The treatment of these complications

depends on the peculiar circumstances existing on the arrival of the practitioner. If he be present before the membranes are ruptured, he may possibly, by judicious pressure through these membranes, so elevate the hand or arm that when the waters are evacuated the head may descend first to the orifice of the uterus, thus preventing the subsequent descent of the arm.

If, however, he be called after the rupture of the membranes, and the hand be detected on the side of the head, he should immediately, with one or two fingers, push it up beyond the parietal protuberance, and retain it there until the head descends completely into the os uteri. Even if the arm has descended, this manœuvre can generally be accomplished. If, however, the head has already passed the circle of the os uteri, the attempt at reduction of the arm or hand should be abandoned. The practitioner should now merely direct the arm toward the temple of the child, so that it may engage with the bi-temporal or bi-malar diameters, the short transverse diameters of the head. When the parietal protuberances reach the inferior strait, the arm, especially when it has been pressed toward the face of the child, will very seldom be concerned; should, however, the hand or the arm be now found involved with the head at the inferior strait, it may generally be practicable, during the absence of a pain, to push up the head out of the strait, and thus allow the practitioner once more to press the arm toward the face of the child. This being impracticable, the head and the extremity may be delivered simultaneously at the outlet of the pelvis.

In all such complications, the practitioner must exercise his discretion, as to the propriety of facilitating delivery by suitable artificial measures, according to the various presentations or positions of the head. The forceps may not unfrequently be required, their use being regulated on principles already detailed, being careful, in the present instance, that the blade of the forceps is always passed between the head of the child and the arm, as otherwise, if passed exterior to the arm, its tissues, not excepting the bones, would be seriously injured.

In cases of pelvic presentation, the management of the arm, when unhappily engaged with the head, has already been detailed.

PRESENTATION OF THE HEAD AND FOOT.—This may arise from similar causes as the preceding.

The *diagnosis*, after the membranes are ruptured and the uterus contracted, can, with some attention, be established.

Treatment.—This must be modified by circumstances. If the waters be not long evacuated, and

the head be low down, the foot should be pressed up until the head has descended so as to occupy the orifice of the uterus. Cazeaux informs us that this is more difficult than when the hand is present; nevertheless, it should be accomplished, if practicable. If this fail, traction should be made upon the limb while the head is pushed upward, and thus, if possible, effect version by the feet. Should there be any difficulty in effecting this mutation in consequence of the powerful contractions of the uterus, these may be mitigated or suspended by means of free blood-letting, narcotics, or anæsthesia, when, usually, version may be accomplished. Such measures failing, it is possible, in some instances, that delivery may be effected with the forceps, provided the blades can be carried to the sides of the head of the child, so as to cause its descent with favorable diameters.

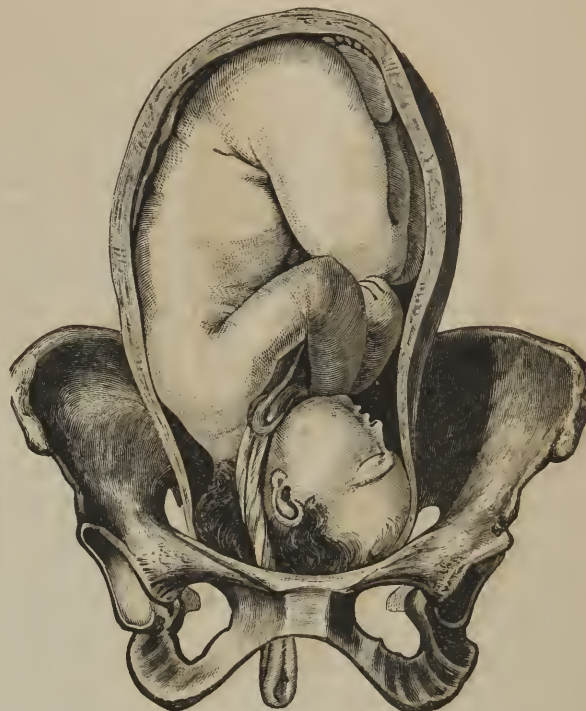
Finally, craniotomy may be demanded to preserve the important life of the mother. M. Cazeaux gives a very interesting case of the left foot descending with the head, the face presenting in a right fronto-anterior position ("left posterior mento-iliac position"). The head, however, was not completely extended, and corresponded, therefore, M. Cazeaux says, to the fourth position of the forehead, according to Baudelocque. All the common modes of delivery failed in this case; the foot could not be returned, the head could not be elevated, strong traction upon the extremity could effect no mutation, the forceps were three times employed, after longer or shorter intervals, but ineffectually, notwithstanding the greatest efforts were made by two accoucheurs, each of whom exhausted his strength to no purpose. The head was then perforated, and the embryotomy forceps were applied twice ineffectually; but on the third attempt, after some difficulty, delivery was effected.

DESCENT OF THE UMBILICAL CORD.—This is an accident of the most serious character as regards the life of the child, as it necessarily subjects the cord to pressure it may be for a long time, interrupting its circulation and, of course, suspending the placental functions. It is well known that such suspension is very rapidly fatal—producing asphyxia, speedily followed by the death of the fœtus. Of course, owing to the small size and the softness of its tissues, the umbilical cord cannot interfere with the process of delivery. The mechanism of labor is therefore precisely the same whether the cord descends into the pelvis or is retained in the uterus.

The causes of this descent in cephalic presentations depend chiefly on the unusual length of the cord. In such instances, owing to the motions of the child in

utero, the cord is usually entwined around its neck or body, but sometimes it floats freely in the liquor amnii,

Fig. 80.



Descent of the Umbilical Cord with the Head.

and may descend to the lower part of the ovum under the head. Of course, when the membranes are ruptured, it presents and descends rapidly with the gush of waters into the vagina, and even externally. In other cases, it is found on the sides of the head, and may, therefore, be washed down before the head reaches the os uteri; while, in others, owing to the obliquities of the uterus, or to some deviations of the head of the child, the cord may prematurely descend.

On examination, per vaginam, therefore, the cord can be occasionally felt under the presenting part of the child occupying the lower portion of the ovum, before it is ruptured. In other instances, a loop of the cord can be detected, as soon as the membranes are ruptured, descending upon the sides of the head.

The *diagnosis*, of course, can be readily made out, and ought to be immediately established. Under these circumstances, the only difficulty is to determine the important question, as to the life or death of the child. If the pulsations of the cord be regular, there can be no doubt of the vitality of the fœtus; but it often happens, however, that there is a temporary suspension of the pulsation, especially during the existence of a contraction of the uterus. Occasionally, also, the child

may be living for some time after all pulsation has disappeared. Hence, it behooves the practitioner to resort very carefully to auscultation, to make frequent and patient observations of the cord, and not to abandon hope until the tissues of the cord are collapsed, and all circulation in it has entirely ceased, or until no motion of the heart can be recognized by the ear. Children are said to have survived even when the cord has been cold, owing to exposure out of the body. Nevertheless, the child soon becomes asphyxiated and perishes; no doubt, as M. Cazeaux observes, from deficient hæmatisis, and not from cerebral congestions.

The *prognosis*, therefore, is favorable to the mother, although very unfavorable to the child. It appears, from Dr. Churchill's statement, that more than one-half of the children perish—fifty-two per cent. fatal. Drs. Collins and Clarke represent it at twenty-five per cent.

Frequency.—Prolapsus of the cord is comparatively of rare occurrence. According to the tabular view presented by Dr. Churchill, it has been met with once in two hundred and eighteen deliveries. It is most frequent in vertex presentations; but, relatively, it is more apt to occur in trunk presentations, and even in those of the pelvis, than in regular cephalic deliveries.

Treatment.—The treatment, therefore, of prolapsus of the funis is of great importance, so far as the infant is concerned, although the mother's welfare is not jeopardized by the accident. If, therefore, the *membranes* be not ruptured, every precaution should be taken to *maintain their integrity* as long as possible. The patient should be kept quiet, in a recumbent position; all disposition to coughing, sneezing, vomiting, and especially to bearing down, should be restrained. This will favor so complete a dilatation of the os uteri, that the second stage of labor may be very rapid. Dr. Dewees dwells much upon this plan. He advises, after ascertaining the presence of the cord, to avoid even "touching;" and mentions an interesting case, where the child's head reached the vulva before the liquor amnii was evacuated. Of course, there was no compression of the cord, and the child suffered no injury.

In the early stages of labor, before the membranes are ruptured, or immediately afterward, most practitioners recommend *podalic version*. This operation, under these circumstances, is not very difficult to execute, and, although somewhat painful to the mother, is generally rapid, and usually successful. Nevertheless, as formerly shown, it is not unfrequently fatal to the fœtus, and, in some instances, even dangerous to the mother. The favorable circumstances for its per-

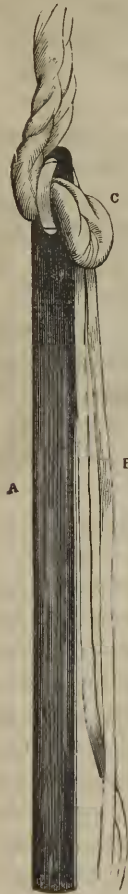
formance are, full dilatation of the os uteri, the membranes unruptured, the vagina sufficiently relaxed, and no disproportion between the fœtus and the pelvis. Should, however, the vagina be rigid, the pelvis contracted, and the waters evacuated, little will be gained by version. Dr. Ramsbotham, after quoting several authorities in favor of this operation, expresses an adverse opinion; inasmuch as the woman's welfare will be endangered, and the safety of the child not materially increased. He quotes Baudelocque, Conquest, Collins, etc., as opposed to indiscriminate version. Dr. Dewees confirms this advice.

Should version not be performed, and in all cases after the membranes are ruptured and tonic contractions of the uterus have ensued, the important indication is, to *protect the funis* as much as possible, from pressure. For this purpose, various suggestions have been made. Of course, if the cord has been down some time, and the circulation has ceased, and especially, if the tissues of the cord have collapsed, and auscultation also evinces that the pulsations of the heart have stopped, the case should be left to the natural process of delivery. The child is dead, and the mechanism of labor will progress as usual. If, however, there be the least hope that the child is living, every effort should be made to restore the cord into the uterus beyond the presenting part, and there retain it until descent be impossible. This desirable object can generally be accomplished, if but a small portion of the cord be recognized when the membranes are ruptured. Two *fingers* of the practitioner will suffice, in most instances, to push it up during the absence of a pain, and retain it until the head descends. Sometimes this can be effected when the loop of the cord is quite long; but when a large portion has escaped through the os uteri, this is impracticable by the fingers alone. In such cases, the whole *hand*—the right or left, as may be most convenient—may be introduced into the vagina; and then, gathering up the cord by the fingers, gradually press it, portion after portion, beyond the presenting part into the uterus, very much in the same manner, says M. Cazeaux, as the surgeon would a hernial tumor by the "Taxis." In performing this operation, it may be well to follow the suggestion of Dr. Gaillard Thomas, of New York, and place the woman on her knees and elbows, so as to make an inclined plane on the anterior surface of the uterus. Dr. T. thinks that this would be sufficient, in some instances, to prevent the prolapsus, if resorted to before the membranes are ruptured. This, probably, is an effectual method. Should it fail, some of the numerous expedients which have been proposed may be adopted. For example, it has been advised to take a common

string or ribbon, double it frequently, and connect it, by means of a stilette, to the lateral orifice of a gum-elastic catheter. Different portions of the umbilical cord can be passed through the doublings of this string, and, by means of the catheter, the whole may possibly be pushed up into the uterus, and there retained.

Another suggestion is, to attach a piece of whalebone, or an elastic bougie or catheter, to a small *bag or purse*, into which the cord may be placed, and thus be restored. As soon as the head descends, the whalebone or bougie may be safely withdrawn.

Fig. 81.



Ramsbotham's Instrument for Prolapsus of the Cord.—A. The whalebone. B. Ends of the Tape. C. Cord loosely retained in the Loop.

Dr. Ramsbotham proposes a piece of whalebone, half an inch wide, and ten inches long. At one extremity, two holes are to be bored, about an inch asunder, through which a long, narrow tape should be passed, the extremities hanging down on the one side of the whalebone, and the loop upon the other. When used, the folds of the funis must be placed within the loop, and the ends drawn moderately tight, so as to secure the funis without any undue compression. The in-

strument is now to be passed into the uterus, bearing the cord above the child's head, and there retained until there is no further danger of descent.

When operating in this or any other mode, should the cord be disposed to return, after replacement, a piece of soft sponge or rag may be pushed alongside of the head into the uterus, so as to retain the funis.

Such, however, is the serious character of this complication, that many practitioners recommend that no time should be lost in attempting to return the cord; but, that immediate resort should be made to version by the feet, as being less dangerous to the child. As a substitute for this painful and hazardous operation, Mr. Croft recommends the hand to be passed into the vagina, to collect the cord and carry it up into the uterus, so as to cast it about the limbs of the child, under the expectation that, when the hand is withdrawn, no further descent will occur. Certainly, this would be no easy operation; it must always be very uncertain as to its results, and would be as painful to the mother as immediate resort to podalic version. Dr. Croft succeeded in two cases. Dr. William Harris, of Philadelphia, in a presentation of the breech, returned the cord over the knees, and the child was saved. It is reported that, in forty cases in the Vienna Hospital, the funis was returned and lodged on the back of the neck of the child, and that thirty-eight of the children lived.

Should these measures fail, or the practitioner be called too late, his first object should be to push the cord back to that portion of the pelvis where it will be subjected to the least pressure. Hence, if practicable, it may be directed toward one of the wings of the sacrum, on either side of the lumbar vertebræ, or toward the temple of the child. Labor should be hastened by every means in his power, under the hope that the child may be born before actual death has occurred. The patient, therefore, should be encouraged to make the most continued bearing-down efforts, flexion and rotation should be facilitated by the fingers or by the lever, and, if the forceps be at hand, they should be applied as soon as circumstances allow. In their use, great care should be taken that no portion of the cord intervenes between the forceps and the head of the child. Nevertheless, death usually occurs so rapidly, that a favorable prognosis can seldom be entertained. In one case, which occurred to the author, a large fold of the cord was felt within the bag of waters under the head of the child, the os uteri being fully dilated. The powerful contractions of the uterus not only ruptured the membranes, but forced many inches of the cord into the vagina and the head through the os uteri. Rapid delivery ensued with such assistance as could be ren-

dered. Although but a few minutes transpired from the rupture of the membranes to the expulsion of the child, it was totally asphyxiated, so that half an hour expired, under the usual appliances, before there was any effort at inspiration. Such cases of speedy asphyxia are common, and indicate the necessity of very rapid delivery where the cord is subjected to pressure.

TWINS.

Although the human female is said to be uniparous, yet there are many exceptions to this general declaration. Labor with twins is not uncommon; occasionally triplets are met with, and in some very rare instances, four and even five children have been the result of a single pregnancy. Cases are reported where a still larger number have simultaneously existed in the uterus, but they deserve no practical consideration.

According to statistical reports, multiple pregnancies are very irregular, being more frequent in some countries than in others. Thus, in Ireland they are very numerous; twin cases in Dublin are reported as one in fifty-seven deliveries, while in London one in eighty-five; in Paris, one in eighty-four; throughout France, one in one hundred and eight; throughout Germany, one in eighty-seven; while in Naples, but one in one hundred and fifty-eight. Dr. Dewees states the proportion in his practice in Philadelphia to be about one in seventy-five. It is generally supposed that twins are more frequent in those countries where the inhabitants are vigorous and laborious, and where the climate is temperate.

Hereditary predispositions are said to exist. Hence multiple pregnancies are more common in some families than in others.

There can be no doubt also that much depends on individual temperament, either of the male or female. Many interesting examples are given by authors. One of the most remarkable has occurred in a neighboring city, in which a lady of very respectable connections is reported, on good authority, to have had, in the course of four years, twelve children, all of whom are living. It were vain to speculate on the causes of multiple pregnancies. It is of importance, however, to observe that very universally each foetus has its own membranes, and of course its own liquor amnii; and although the placentæ are generally united in one mass, yet each child has usually its own independent circulation, there being no inosculation of the blood-vessels with those of its fellow. Exceptions to this remark are said to exist. The compound placenta is generally of an oblong shape, with more or less of indenture, indicating which portion belongs to one child, and which

to the other; this is still more distinctly pointed out by the reflections of the chorion and amnion of each child on the surface of the placenta, so as to form the partition between the foetuses. (See Fig. 31, on page 64.)

Fig. 82.



Twins in the Uterus.

In some instances, however, the placentæ are entirely distinct, sometimes occupying adjacent portions of the uterus, and sometimes far separated. In a case to which the author was called in consultation with the late Dr. Joseph Klapp, a placenta followed the delivery of the first child and subsequently another after the delivery of the second child. Many similar cases are upon record.

The independent life of twins is also proved by the fact that one child often perishes, while the other survives and flourishes. Hence, at term, a strong vigorous child may be delivered, preceded or followed by a foetus of a few weeks' or few months' development, in a more or less softened or macerated condition. What is still more remarkable, Velpeau quotes Peu, Smellie, Chapman, Periard, and Cruveilhier, in regard to cases where one child was actually putrid, sometimes being discharged piecemeal. Such cases can only be explained on the supposition that the membranes of one foetus have been ruptured, the liquor amnii evacuated, and the atmospheric air admitted to the sac, as otherwise no decomposition could have ensued.

Perhaps a still more remarkable statement is given by Merriman of the delivery of one child prematurely, when labor ceased, while the second child, being retained in one case for fourteen days, and in another for six weeks, continued to be developed.

When one child perishes in utero, it sometimes happens that its placenta also dies, being delivered eventually in a withered, bloodless condition, with more or less alteration of its natural color. In a few instances, twins occupy the same amniotic sac, there being but one set of membranes, and a common bag of waters. This must be the case in all instances of "double fetuses." Authors report similar cases where the fetuses were entirely unconnected. Dr. Bedford, of New York, has detailed a very unique example of twins of seven months which had been dead for two weeks, and putrid. There was but one ovum and one placenta, which was evidently healthy and unaltered, while there were two cords twisted around each other, and both attached to the centre of the placenta.

It seems to be proved by statistical observations that in a majority of twin cases the sex is different, a girl and a boy generally coexisting. Twin boys are more common than twin girls.

Dr. Simpson, of Edinburgh, has examined the question as to the *fecundity* of girls who are twins, and shows that there is no difference in this respect between twins and single children who have arrived at maturity.

The *mortality* of twins is said to be about one out of four children. Much of this mortality must doubtless be attributed to inattention or want of proper management on the part of the attendants.

In cases of triplets, the deaths are more numerous. Dr. Churchill states them as one in three. Of course, the deaths are even more frequent in cases of quadruple or quintuple pregnancies.

The mortality in all compound pregnancies is usually increased by the fact that the women seldom go to the full period of utero-gestation; the children are premature, and therefore more readily perish. Even at term they are smaller, and generally more feeble than in cases of single children.

In a late case of twins, the patient assured the author that she was perfectly confident that her pregnancy had lasted but six months and three weeks. Both children survived.

The *weight* of each child in twin pregnancies is very universally less than that of a single child; but their conjoint weight is greater. Thus, the two children often weigh twelve or fourteen pounds, occasionally even sixteen, but this is rare. In twin cases, children generally average five or six pounds each. The com-

pound placenta is also heavier than that of a single placenta. Where the placenta of twins are separate, each one is generally small, compared with that of a single child.

No confidence can be placed in any of the supposed signs as to the existence of twins excepting auscultation. The greater size or the peculiar form of the abdomen, the sensations of the patient as to the motions of the child, etc., or any facts developed in an internal or external examination by the practitioner, are all very uncertain and delusive. By auscultation, however, especially toward the latter periods of pregnancy, we can determine the existence not merely of one, but sometimes of two hearts, in different portions of the uterus, indicating the presence of two children. Moreover, even the presentation of the children can sometimes be predicted. If, for example, cardiac pulsations can be recognized toward the left and inferior part of the abdomen, and also to the right and superior part, the legitimate inference would be that one child presented the head, and the other the pelvis. When both hearts are perceived in the hypogastric regions, it may be inferred that each child presents the vertex. Great care, however, must be taken to prevent mistakes, and doubtless, in many instances, the diagnosis, even by auscultation, would be uncertain, if not impossible.

Let it be observed that the mother should always be kept in ignorance of the existence of twins, even if the practitioner is satisfied on this point, as women very universally consider themselves in more danger than when there is but a single child.

The *symptoms of labor in compound pregnancies* are very similar, and sometimes identical with those of single pregnancies. As the children are generally smaller, labor, in a mechanical point of view, may be, and often is, much more easy. Hence, if the pains be energetic and the os uteri well developed, the second stage of labor is often very rapid.

Nevertheless, as a general observation, the first stage of labor is tedious, and not unfrequently the same is true of the second stage. This tediousness, no doubt, arises from the greater size of the uterus, and is in obedience to the general law, that the contractions of the uterus, as regards their frequency and force, are inversely to its size. Hence, when the uterus is distended by liquor amnii, with two or more fetuses, it acts feebly; but when the waters are evacuated, or one child escapes, its actions are more vehement.

Treatment of Labor in Compound Pregnancies.—During the first stage of labor, even if the diagnosis be perfect, no peculiar attention is demanded; the patient should be treated as in ordinary cases of

labor with inertia. After the os uteri has dilated, however, if the contractions remain feeble, and the presentation of the first child be natural, the membranes may be ruptured, and the patient encouraged to make the usual bearing-down effort.

Should, however, the presentation be unfavorable, the usual means of correction should be immediately adopted, and sometimes, therefore, *podalic version* may be demanded. In performing version, great care should be taken not to rupture the amniotic sac of the second infant, and also to seize the feet of the first child. The latter rule becomes more important where, as is sometimes the case, both children are surrounded by the same membranes, there being but one ovum. Any mistake on this point might be of vital importance to the children, and even to the mother.

As soon as the first infant is born, a careful examination should be made externally as to the condition of the uterus. Advice has already been given that such an examination should never be delayed, even in the most normal labors. In the present instance, it becomes more imperative, as the diagnosis of twins is seldom established prior to the birth of the first child.

If the uterus be found large, extending above the umbilicus, prominent, and hard, it is a fair inference that there is another child in its cavity. An internal examination should immediately be made, when the os uteri will be found considerably dilated, and, very universally, another ovum will be detected. If, however, the membranes be ruptured, the presenting part of the second fœtus will readily be felt. The uterine contractions generally intermit, and the practitioner should occupy the time with the necessary attentions to the new-born, and especially in tying the ligatures to the umbilical cord, and dividing it between them. The second ligature is requisite, because there may be an inoculation of the blood-vessels in a common placenta.

The accoucheur should not leave the bedside of his patient, but carefully repeat his examinations, and determine precisely the presentation of the second child, and also its position. If these be favorable, the general advice given by authors is to leave the completion of labor to the natural processes. To this advice there can, perhaps, be no serious objection; but the question necessarily arises, how long should we wait? Dr. Collins informs us that of two hundred and twelve cases, the second child was born within fifteen minutes after the first, in one hundred and fifteen instances; that one hundred and sixty-three were delivered within thirty minutes, and of the remainder the intervals were various, extending, in one instance, for twenty hours.

The objections to waiting any length of time are important, as

First. The danger of hemorrhage, from partial, or, it may be, complete detachment of the placenta of one or both children.

Second. The danger of inertia, by which the liability to hemorrhage is greatly augmented; and such hemorrhage may, under the circumstances, be "occult;" the second ovum so obstructing the os uteri, that little or no blood escapes. Indeed, the very fact that the labor is not completed, is a proof of at least partial inertia of the uterus.

Third. The mental and moral condition of the mother affords a very strong argument that there should be no unnecessary delay. The knowledge of the fact, that another child is to come, will disturb the nerves of most women. In one instance, a lady, under the care of the author, fell into convulsions on the announcement that there was another child; and, in all instances, there will be more or less mental anxiety and consequential disturbance of the nervous and vascular systems.

Fourth. It may be added that the life of the second child is in danger until it is delivered, as it is liable to perish from suspension of the placental functions, or from other accidents.

The patient should always be advertised, in the most cautious manner, that another child is to be born. This information should be accompanied with a favorable prognosis, intimating that the child is small, the passages relaxed, and the delivery will soon be completed.

While there should be no *interference* with the natural processes, and while there should be no inordinate haste, the second infant should not be permitted to remain long in the uterus.

The first child, therefore, being removed, the mother having been refreshed from the immediate effects of her former efforts, and the child presenting naturally, the accoucheur, at the expiration of ten or fifteen minutes, should facilitate the progress of labor. Gentle frictions and moderate pressure should be made over the abdominal parietes; the patient should be encouraged to make a bearing-down effort, during the existence of which the membranes should be ruptured by a finger or hand introduced into the vagina. The os uteri and the vagina having been already dilated by the passage of one infant, no delay need be anticipated, especially as the second child, as is usual in twin cases, is comparatively small.

If the uterus do not contract after the evacuation of the liquor amnii, the appropriate treatment for inertia must be instituted; and, if necessary, manual or instru-

mental assistance may be resorted to, according to the peculiar circumstances of the case. Occasionally, it may be proper to exhibit the *secale cornutum*, according to rules hereafter to be detailed.

Of course in all twin cases, not the least traction effort should be made upon the umbilical cord of the first child, for fear of hemorrhage, also of premature separation of the placenta, and the death of the second infant. Occasionally, however, the placenta of the first child is spontaneously delivered, and that without injury to its mate or to its mother.

When the delivery of both children is completed, the removal of the placenta should be left to the natural processes, or be artificially performed according to established rules. Let it be observed, however, that in multiple pregnancies there is more danger of inertia of the uterus, and more liability to hemorrhage, demanding attention and promptitude from the practitioner. When traction is requisite, one cord should be acted upon more strongly than on the other, so as to determine the placenta edgeways, rather than perpendicularly, to the orifice of the uterus. The double placenta will also more frequently demand the introduction of the fingers or of the hand into the vagina, than a single placenta; and in all cases, great care should be taken to insure the regular tonic contractions of the uterus.

Such is the history and treatment of favorable cases of twin pregnancies; and although there be more danger to the mother and her infants than in labor with a single child, yet with proper care and attention, a happy termination may be generally anticipated. This is certainly our experience.

Many difficulties may, however, be observed, as after the delivery of the first child, it may be found that there is a *mal-presentation* of the second. No time should be lost in correcting the presentation, or in resorting to artificial delivery, for powerful contractions of the uterus may almost instantaneously ensue, and fix the child in its unnatural presentation. Should, therefore, a shoulder presentation be recognized, version of the head or the feet should be performed immediately.

Other difficulties at times exist which may be comprehended under the general expression of the *interlocking of twins*, or the interference of the second child with the delivery of the first. This may be regarded as the most serious complication of twin labor.

The interference is sometimes trifling, and is more apt to occur when both children occupy the same ovum, or when the membranous partition between them has been prematurely ruptured. The first child, for example, presents the head; but a foot or hand, and some-

times both, may be found descending with it. Great care should be taken to determine, if possible, whether it be the hand or foot of the first or second child; but in all instances it should be pushed up as far as possible, until the head has completely descended. Dr. Christie, of Aberdeen, has, however, recorded a case in which he pursued a different practice, pushing up the head above the superior strait, so as to allow the descent of the limbs and body of the other child. In this he succeeded, but the practice cannot, we think, be recommended, as there will be great danger of a re-descent of the head before the first child is completely delivered. If, therefore, the feet cannot be replaced, the head of the other child should be artificially delivered, as already recommended.

Authors record cases in which both heads engage together in the cavity of the pelvis. This certainly, if the heads be of the usual size, cannot be strictly correct, as the pelvis is not large enough to receive both at the same time through the superior strait. If, therefore, one head descends so as to be in close contact with the other, it must be more or less movable, and if recognized, can be pushed up so as to allow the descent of that head which is lowest in the pelvis. We apprehend, therefore, that the difficulties which have been attributed to this complication arise not strictly from the simultaneous descent of both heads, but from the meeting of the thorax of the first child with the head of the second. This last may have descended partially into the pelvis, when the head of the first is on the perineum, and its chest entering the brim of the pelvis, so that there may be a compression of the head of the second child on the chest of the first in the proper cavity of the pelvis, sufficient to arrest the progress of labor, and, it may be, to prevent delivery even by the forceps, demanding, as is reported, the use of the perforator. Such cases are exceedingly rare.

Sometimes both children present the pelvis; this seems to be less frequent than other presentations of twins. Such presentations of the pelvis are generally "irregular;" the feet being found at the orifice of the uterus, or in the cavity of the pelvis. These should be carefully examined, as they may belong to the second child. If they belong to the first, no peculiar danger will exist; but if to the second child, great care should be taken to replace them as far as possible within the uterus, until the first delivery is accomplished.

Pleisman mentions an extraordinary case where four lower extremities and one hand simultaneously presented. He hesitated as to what should be done. The case ought not to be left to nature, for fear two children should simultaneously descend, and of course pre-

vent delivery. Neither was it safe to make traction effort upon one pair of limbs, not knowing what would be the result. After some reflection he adopted the recommendation of Hippocrates to suspend the mother by her lower extremities, which were given in charge to the husband and brother of his patient. The body of the woman was so elevated that her shoulders and head alone remained in contact with the bed. Two limbs now spontaneously retracted within the uterus: this allowed the introduction of the hand, by which the first child was delivered footling, then a second, and finally a third in the same manner.

A more serious complication arises when the first child presents the pelvis, and the second the head. In some few instances of this kind, after the lower extremities and the breech have entered the vagina, the head of the second child descends into the pelvis with the thorax of the first. The contractions of the uterus continuing, both are compressed together in the cavity of the pelvis, constituting, unless the children be very small, a case of impracticable labor. Velpeau mentions a case where the os frontis of the second child compressed the thorax of the first, the chin of the one passing under that of the other, arresting delivery.

Madame Lachapelle mentions a case where the head of one and the chest of another child simultaneously engaged in the pelvis; there was, however, a spontaneous delivery, as the children were very small.

The *treatment* in all these cases of interlocking may be instituted with a good prospect of saving the life of the mother, and occasionally of one infant, at the sacrifice of its twin. The following case, where labor had been long protracted, death ensued to the children and to their parent.

A woman fell in labor at the Philadelphia Hospital, Blockley, and upon examination it proved to be a breech presentation; delivery was arrested at the time the breech of the child was at the outlet, when it was discovered that the head of another fœtus was in the pelvis conjointly with the thorax of the child now partly delivered. Various attempts were made ineffectually to finish the process; eventually the abdomen of the first child was opened, the viscera of this and the thoracic cavity were removed, allowing the further descent of the child, but delivery was still impracticable. Upon the arrival of the author, several hours afterward, he found that the uterine efforts had entirely ceased, and the patient was greatly prostrated; the body of the first child eviscerated, with its thorax still in the pelvis, and the head of the second below the linea ilio-pectinea, and immovable. While stimuli and nourishment were freely administered to the exhausted patient, immediate delivery was imperative. This was

accomplished by bringing down the arms of the first child externally, and making so much traction effort that the root of the neck could be reached, when decapitation was effected. There was then no difficulty in delivering the second child, and afterward the head and neck of the first. There was no hemorrhage, although the uterus remained large, demanding the introduction of the hand, of a sponge filled with vinegar, and external pressure and frictions to induce its contractions and allow the removal of the placenta. There was no reaction, however, of the powers of life in the mother, and her death occurred in a few hours.

In Velpeau's case of the interlocking of the chins, delivery was accomplished in the same manner. Dr. Dewees quotes a case from Dr. Irwin, where the body of the first child was completely delivered, and the head was arrested. Other measures failing, the crotchet was employed, and delivery was thus accomplished. No doubt, in this case, the children were small, and the crotchet being fixed upon the thorax of the first child, the practitioner must have drawn down the head of the second with the thorax of the first, a practice which certainly cannot be defended.

The rules of practice in these unfortunate cases are, therefore, very clear.

First. To ascertain, as early as practicable, whenever the breech or feet are recognized, whether the head of another child is also descending; if so, immediately push up the lower extremities or the breech, so as to allow of the descent of the other head below the limbs of this child, if practicable, or with them, if they cannot be completely returned.

Second. If the pelvis has already reached the inferior strait, and a head be engaged with the thorax in the cavity of the pelvis, traction effort may be made, and embryotomy on the first child be performed as soon as practicable, as there is no possibility of preserving its life. The abdomen, therefore, should be immediately perforated, so as to allow of the escape of the viscera, and a collapse of the body of the child, thus facilitating its further descent through the pelvis. Such descent may be hastened by traction on the lower extremities, or by a hook on the pelvis of the child. A similar operation may be performed on the thorax as soon as it is within reach; perhaps this operation may be facilitated by dividing the ribs or their cartilages with the craniotomy scissors. A continuance of the tractile efforts upon the body, and now upon the upper extremities, will soon enable the practitioner to reach the cervical vertebræ, which, with the portions of the neck, should be completely divided. The head thus liberated from the body, glides above the superior strait, and no serious im-

pediment will now remain to the delivery of the second child. Should any delay occur from the inertia or exhaustion of the uterus, the forceps should be applied. If this rule be adopted early in labor, and its execution be effected without any great delay, much hope may be entertained of the safety of the second child.

Third. Should it, however, be found impracticable, from any cause, to decapitate the first child, there is still a final resort to craniotomy on the second child, to be followed by the compression of the head or of the removal of the bones of the cranium, or by decapitation, according to the necessities of the case.

There may be and doubtless are many varieties of this interlocking of twins; but the general principles already detailed will be sufficient for the scientific accoucheur. M. Jacquemcier, however, relates a most interesting case, in which he, with all his skill and experience, was completely foiled. The first child presented the head, which became arrested. The forceps were several times applied, and other measures resorted to, but ineffectually. The woman perished. A *post mortem* revealed the fact that it was a case of twins, the first child presenting the head in the pelvis, while the second child presented the left shoulder in a dorso-pubic position, so that its head was in the right iliac fossa, its neck under the right shoulder of the first child, and its body on the left side of the pelvis. It was in reality an interlocking of the two necks—the shoulder of the first child resting upon the neck of the first, so as to prevent its descent, notwithstanding the powerful traction applied by means of the forceps.

Respecting the *management of labors where three or more children are present*, no special directions are demanded. The children are so small that no great mechanical difficulty can exist. The accoucheur, however, should bear in mind that inertia of the uterus is more frequent, and also that there is more danger of hemorrhage from the large size of the placenta and the greater number of patulous, bleeding orifices existing on the uterine surface.

DEFORMITIES OF THE CHILD.

The interesting subject relating to the causes and varieties of malformed *fœtuses* has received great attention. As respects the mechanism of labor and its scientific treatment, we are concerned simply with those cases in which the head or body are preternaturally large, and with those in which there is a multiplicity of parts, so important as to interfere with the natural process of delivery, including, of course, children with

two heads, two bodies, more or less conjoined or separated, but still adhering to each other—adherent twins, as they are sometimes called.

As regards the first of these divisions, *the head may be of an unusual size* in proportion to the straits of the pelvis, and yet the child be in a good physiological condition. Such cases have been already noticed, and their treatment detailed. In other cases the enlargement of the head arises from some pathological state: as from the formation of tumors or other preternatural growths, from within or without the cranium; but more frequently from the effusion of water within the head, constituting hydrocephalus. (Plate XXXII., Fig. 158.) In such cases the head is often enormous, owing to the great development of the commissures and fontanelles, and consequent separation of the bones of the vault of the cranium to considerable distances one from the other. The base of the cranium is, however, too firm to admit of such developments, hence, the face and base of the head always appear very small in proportion to that of the cranium, and not unfrequently are less developed than is usual at term. The body of the child also is generally small in proportion.

Dr. Meigs gives an interesting case of a deformed *fœtus*, presented to him by Dr. Rohrer, in which there was a deficient development of the cranium, and to the occipital region there was appended an enormous sac, nine inches in length, filled with fluid, and lined by the membranes of the brain.

More rarely it has been observed that such dropsical effusions are located in the *chest* or *abdomen*, producing enormous distension, even where the head is of normal size. The abdominal swelling is reported by Depaul as being not unfrequently dependent upon an enormous distension of the bladder without any effusion into the peritoneum. It is reported also that the distension may be sometimes tympanitic, and not dropsical. So also tumors, etc., may be developed upon the body, as well as upon the head of the child.

The second general division of malformations is that of *multiple or compound fœtuses*, or, as they have been termed, “adherent twins,” or “engrafted twins.”

Much attention has been paid, of late years, by scientific physiologists, to the causes, varieties, and developments of the partial or complete union of germs or embryos. M. Geoffroi St. Hilaire has especially devoted much time to this subject, and has systematized the results of his minute and laborious investigations. The student interested in such inquiries will find much to reward him by consulting late treatises on the monstrosities not unfrequently presented in the animal and vegetable kingdoms.

In obstetrics, but a few facts need be stated:—

First. That in all these instances there is but one amniotic sac.

Second. That very universally there is a single placenta.

Third. That, in many instances, there is a deficiency of parts, and, therefore, there will be no mechanical impediment to delivery.

Fourth. That sometimes one foetus or embryo is enclosed within the other (monstrosity by inclusion); this very rarely, however, interferes with labor.

Fifth. Adherent foetuses may be occasioned by bands, as in the case of the "Siamese Twins;" more frequently there is direct cohesion by the hips at the back or sides, or in front, and yet the organs of both are distinct, so that, in a few cases, one child has survived for a short time the death of the other. Such adhesions have occasionally also occurred simply at the occiput.

Sixth. In a large number of cases, one embryo seems to be "engrafted" on the other, so that there is a greater or less deficiency of parts; the most numerous examples are cases of bicephalous children, very frequently with cervical vertebræ to each head with a common body. In other cases the division continues through the thorax with a common abdomen and lower extremities; occasionally the division continues to the pelvis. (Plate XXXII., Fig. 159.) The reverse is also true; the child may be single above, yet double, to a greater or less extent, in its trunk and extremities; there may be four lower extremities, for example, and two pelves.

For practical purposes this general account will be sufficient.

The *diagnosis*, in cases of the deformity of a single foetus, must, therefore, be surrounded with difficulties, and the practitioner must often be contented with watching the progress of the case, that he may gain further information of its character, and judge whether any assistance be demanded to complete the process of delivery.

It may be observed, however, that in hydrocephalic cases, where the head presents, the diagnosis can generally be readily substantiated after the rupture of the membranes by careful examination per vaginam; sometimes, it may be, demanding the introduction of the hand into the vagina, that the finger may penetrate deeper into the uterine cavity. The detached bones of the cranium, the large commissures and fontanel, tension of the head during the contractions of the uterus, and its comparative flaccidity, when the womb is relaxed, the large size of the head, and its remaining high up above the superior strait, may then be recognized.

In pelvic presentations, the diagnosis is very diffi-

cult in most cases, inasmuch as the base of the cranium and the face can alone be felt. Sometimes, however, the finger can be passed to the sides or posterior part of the head, so as to recognize the large commissures. Suspicion, however, may exist as to the nature of the case, if the body of the child be small, and the head firmly retained at the superior strait under the ordinary attempts at delivery.

It may happen that the head may be of the ordinary size, and pass down readily into the pelvis, when delay may occur from the enlargement of the chest or the abdomen. The diagnosis, of course, will be very difficult, but owing to the pliability of the tissues, the head will generally descend so low, that portions of the thorax or abdomen may be reached by the practitioner, and its distension recognized. If it be a pelvic presentation, however, the cause of delay can usually, in such cases, be readily ascertained by a vaginal examination.

Treatment.—In cases of deformity of the foetus the treatment varies exceedingly. In all cases of a *deficiency of parts*, as in acephaloid and anencephaloid foetuses, no assistance is demanded; the labor is, strictly speaking, natural, and often more rapid than usual, in consequence of the diminutive size of the child. This, however, is not always the case, as the body of the child is sometimes preternaturally large. A case occurred to Dr. Bridges, of this city, of twins; the delay in the delivery of the first child was so great, that he requested the author's assistance. The child was delivered in safety, and proved to be under size. The second child presented the breech; the delivery was slow and painful, requiring considerable assistance. The foetus proved to be deficient, not only as regards the head and neck, but also the upper extremities; the body, however, was large, and nearly twice the ordinary circumference; causing, therefore, delay in its delivery.

In cases of *hydrocephalic children*, the process of parturition should be conducted as in other cases of enlarged heads; the degree of assistance demanded depending upon the disproportion of the size of the head to that of the cavity. Not unfrequently a puncture of the head for the evacuation of the water and the consequent collapse of the tissues is requisite, after which nature is usually adequate for delivery. The author has been in the habit of recommending that such perforations should be made with a very small instrument, and at a distance from the lateral and longitudinal sinuses of the dura mater, under the faint hope that the child thus treated may survive, as in operations of paracentesis of the head in hydrocephalic children after birth. However undesirable a life may appear for such unfortunates, as permanent recovery is

not to be expected, yet it is the serious duty of the practitioner, even in such cases, to contribute all in his power to its preservation.

In cases of pelvic delivery, where the head is retained at the orifice of the uterus from this dropsical distension, when the diagnosis is established, puncture of the cranium may be made, behind the ear of the child, as formerly directed in similar cases, where the ordinary means of delivery are ineffectual. The author was once called to the assistance of a practitioner, where this complication existed. He found the body of the child, which had been completely delivered for a considerable time, was unusually small, and dead, the cord being pulseless and cold. The base of the cranium was found at the os uteri, extending parallel to the left oblique diameter of the superior strait. With some effort the fingers of the left hand could be carried to the orbit of the left eye, by means of which a small blunt hook was directed to the orbit, and there fixed so as to cause flexion of the head, on the principle already detailed in the treatment of pelvic presentations where the head is retained. To our great surprise, this was speedily followed by a gush of water, succeeded by the flexion and speedy delivery of the head. On examination, it was found there had been great dropsical effusions, and that under the pressure to which the head had been subjected, the superior orbital plates of the eye had given way, so as to allow the dropsical cysts to protrude into the orbit; when traction, therefore, was made by the hook, the compression of the dropsical sac in the orbit was so great that it was ruptured, allowing the collapse and delivery of the head.

This case indicates that where perforation of the cranium, in these instances, cannot be made in any other direction, it may be accomplished through the orbit of the eye, especially if the face be detected toward the anterior or lateral parts of the pelvis, as in sacro-posterior positions of the breech.

In those still more rare cases, where *dropsy of the chest or abdomen* is found to be an impediment to delivery, mere traction effort, owing to the compressibility of the tissues, will usually be sufficient. If, however, the body be enormously enlarged, a small puncture with the trocar and canula can readily be made, so as to evacuate the fluid, and thus insure an easy transit to the child. In making such puncture, care should be taken to avoid all vital or important organs, as the child's life is not necessarily destroyed by this operation of tapping.

MULTIPLE FŒTUSES.—In cases of deformity from *multiplicity* of parts, especially in children with two

heads, (Plate XXXII., Fig. 159,) or two bodies, or in cases of double children, adherent more or less closely, etc., it might seem that natural delivery was impracticable. Nevertheless, in very many such cases, delivery has occurred spontaneously, and, occasionally, the child or children survive. Of course, few opportunities present themselves to any practitioner of studying the *modus operandi* of delivery in these deformities; and even when the accoucheur has been present, the details of the process have not been accurately perceived, and few records have therefore been given.

In multiple children, whether simply adherent or "engrafted," the *mechanism of labor* can be explained in one of two ways:

First. When there is a cephalic presentation, one head descends into the cavity of the pelvis, while the other is retained above it with great lateral flexure of the cervix. By powerful contractions the first head is delivered, and the second immediately descends into the pelvis, and passes out before the shoulders are engaged.

The author was once called to a case of this character: the child was born before his arrival. The practitioner in attendance said that, at first, there was some difficulty; but soon one head was expelled, followed rapidly by the other, without difficulty. The details of the process he could not well explain. The child's body was small, the heads were of moderate size, having two necks, united at the apex of the thorax. It was still-born.

In consulting authors upon this subject, it would appear that they regard this as the only mode of delivery, whether the child presents the cephalic or pelvic extremity of the ellipse. As M. Cazeaux says, that if two heads appear at the lower part of the uterus, the anterior head, from the obliquity of the pelvis, descends first and is delivered, being followed by the posterior head, and, subsequently, by the body of the child. If, on the contrary, the body be delivered, it is the posterior head which descends first, followed by the anterior head.

If, however, in either case, there be a parallelism of the heads, or if one head be retained toward the posterior or anterior part of the pelvis, the labor becomes impracticable, and art must interfere.

In cases, also, of a double fœtus united at the pelvis, as Cazeaux and Velpeau intimate, delivery occurs in a similar manner; that is, if one head presents, it is followed by the other before any portion of the body is delivered. If, on the contrary, the pelvis be delivered, then the posterior head descends under the anterior, and thus delivery can be accomplished.

It may be true that, in some instances, where the

compound fœtus is very small, delivery may occur in the manner mentioned. It seems to us, however, incredible, if bodies of the ordinary size be united, that they could pass simultaneously through the pelvis; or, if the heads measure the usual diameters at term, that they would not frequently descend together, so as to be arrested at the brim of the pelvis. The probability, therefore, is that, in a large majority of these cases, delivery must be accomplished in a way now to be detailed.

Second. This mode of delivery is very analogous to that of spontaneous evolution; one head of the child and its neck gliding toward the anterior part of the pelvis, so that the pubis sinks between the two heads to the root of the neck; the other head, descending into the cavity of the pelvis, passes out at the vulva, and revolves on the top of the arch of the pubis in front of the symphysis, followed by the shoulder, side of the thorax, hip, and lower extremities, which, being delivered, the remaining head descends through the pelvis, and readily passes out. In this case, one head takes the place of the shoulder, under the arch of the pubis, while the central point of evolution is now at the apex of the chest, between the two necks, instead of upon the side of the neck, as in shoulder presentations. In a pelvic presentation, with these bicephalic children, the difficulty will be greater, as, generally, both heads are simultaneously forced toward the superior strait, and, of course, they would be arrested; but it may happen that one glides under the other into the pelvis, and is delivered externally, without serious interruption from the other head, which, in such cases, is situated above it.

Similar modes of delivery doubtless occur in case of adherent twins, where the adhesions are more or less intimate. In the case of the Hungarian sisters, where there were two complete bodies, but a close adhesion at the loins, or the Siamese children, where there was a fleshy band from one epigastric and umbilical region to the other, we can imagine that one child, presenting the head, passes readily through the pelvis, until arrested by the symphysis pubis, at the point of adhesion; the head and thorax of the other child being retained in the uterus and superior pelvis. The process of evolution now commences at the point of adhesion between the children, under the symphysis pubis. The head and thorax of the first child now rise up in front of the symphysis pubis, while the side of its abdomen and hip pass successively through the vulva followed by its lower extremities, and, immediately afterward, by the lower extremities or breech of the second child, which is then readily delivered as in other pelvic presentations.

More obscurity exists where these double children present footling, especially if it should unfortunately happen that the four lower extremities are detected in the vagina, as it would be impossible to determine, *a priori*, whether the children are separate or adherent. Delivery, in such cases, spontaneously, would seem to be impossible; but in other instances where the extremities of one child descended, while those of the other were retained, then the breech of the second child might glide over the symphysis pubis, and the first child, being delivered until the point of adhesion reaches the arch of the pubis, evolution upon this point at the pubis might ensue, so that the side of the abdomen, the thorax, and eventually the head be born, as in other cases of evolution, excepting that the pelvis now, and not the shoulder or head, rises in front of the symphysis pubis; and the centre of evolution is now at the lower instead of at the superior edge of the adherent portion. But, of course, delivery would be much more improbable in such cases, and very often could not occur; the process, however, is facilitated by the usual small size, and of course by the greater flexibility of the children in these twin cases.

The adhesions between twins sometimes occur at the pelvis, and sometimes at the head; in the former case, if the head of one child presents, we can conceive that there will be no difficulty in the delivery upon the principle of evolution as already explained; if, however, it be a breech presentation, spontaneous delivery we should regard as almost impracticable, if the children be of the ordinary size, as both bodies and both heads would probably be simultaneously engaged. MM. Velpeau and Cazcaux, however, countenance the idea that the compound fœtus would usually pass, one head descending under the other. In the latter case, where the union is between the crania, spontaneous delivery, if it be a cephalic presentation, could not occur, as both heads would be nearly or quite parallel. If one child presents the breech, delivery may easily ensue, provided the second child be retained above the superior strait. Should, however, both bodies be simultaneously engaged in the pelvis, delivery could hardly be accomplished.

Dr. Meigs details the case of a double-headed child which occurred to Dr. Pfeiffer, of Adams county, Pennsylvania, in 1844. Dr. P. succeeded in effecting delivery upon the principle of evolution, in the manner already detailed. Dr. Meigs is of the opinion that this is the only way in which such children can be born.

Dr. Simpson reports a most interesting case which occurred to his friend Dr. Lyell, of Dundee, of a double fœtus united from a little below the navel to the upper

portion of the sternum; both sterna were so divided that there was one vast thoracic cavity. Dr. Lyell was called to the case at nine P. M., finding the os uteri but partially dilated. At midnight he detected the head presenting, but as it did not advance, and the pains were inefficient, he applied the forceps, and without much difficulty the head was delivered, but no traction on the head or neck would cause the body to descend. Dr. L. then brought down first one arm and then the other of the child, but still there was no descent, the whole of the pelvis being impacted. At this juncture he perceived a third hand, which confirmed his suspicion of the existence of twins. He now passed his left hand on the back of the child, whose head was delivered, and succeeded in reaching the breech, which he brought down into the pelvis. He re-entered his hand, found the limbs of the second child, and drew them down with those of the first child. He thus, after great effort, accomplished the delivery; the head and neck of the first child rising in front of the symphysis pubis, while the body, breech and limbs passed successively through the vulva, followed by the limbs, body, and finally by the head of the second child, a fine example of evolution; the point of rotation being at the upper extremity of the adherent chests, between the two necks.

These observations may convey a general idea of nature's efforts in such unfortunate cases, and although innumerable modifications may exist, yet they afford a foundation for scientific treatment.

The *diagnosis* in cases of multiple children must necessarily be very dubious. The practitioner must trust to his anatomical knowledge, and to his acquired skill in obstetrics. Occasionally, especially after labor has progressed to some extent, the cause of delay or difficulty may be recognized; but the full nature of the case is seldom developed until after delivery. Where two lower extremities are detected per vaginam, the practitioner should ascertain, if possible, whether they belong to one child; he should notice, therefore, whether there be one right and another left, and if so, trace them at once to the pelvis. If, however, two right or two left legs are observed, indicating a second fœtus, he should ascertain whether the two pelvises are conjointly entering the superior strait, or whether one descends before the other. A little judicious traction

effort upon one or more limbs will often facilitate this important part of the diagnosis.

The advice of Hippocrates to elevate the lower part of the body of the woman very high above her head and shoulders would also facilitate the diagnosis, as under these circumstances the pelvis and lower extremities of one child might retire to such an extent as to leave no doubt to which pelvis they belong. This retraction, however, could hardly occur, if the children were adherent.

Treatment.—In all such cases, the treatment must of course be governed by their respective peculiarities; they may, or indeed must, be left for some time to the natural efforts; but there can be no doubt that art and science can very often greatly facilitate such spontaneous exertions, and contribute very essentially to the welfare and safety of the parent, and it may be of the children.

Thus the process of *spontaneous evolution*, wherever any tendency to it is evinced, can be greatly facilitated according to rules already given, either by the hand or the instruments of the accoucheur. In other cases, the use of the *lever* or *forceps* may be advantageous; while, in other instances, decapitation or other modifications of embryotomy may become essential for the preservation of the mother.

The usual direction in all multiple children to *push up the parts of the second child*, which may interfere with the delivery of the first, should never be forgotten.

M. Velpeau affirms that in nine cases out of ten such monstrosities can be delivered by *podalic version*. This is a strong assertion, and, coming from such an authority, ought not to be disregarded. No doubt, if the compound fœtus be small, the delivery would be easily effected by version; but if the woman has gone to her full period, it appears to us that version by the feet would exceedingly enhance the difficulties and dangers of the case, for reasons which have already been detailed. On the contrary, in almost all instances, it would be much better to carry out the principle of evolution as far as practicable.

In extreme cases, *embryotomy* must be our final resource for the safety of the mother, even if unfortunately the fœtuses should be alive. The Cæsarean section should never be resorted to, unless in cases of extreme deformity of the pelvis.

CHAPTER XX.

DYSTOCIA.—COMPLICATIONS FROM THE MOTHER.—DEFORMITIES OF THE PELVIS.—MALPOSITIONS AND OBLIQUITIES OF THE UTERUS.

THE *second division of Dystocia*, according to the arrangement proposed, (Table on page 141,) includes those complications of labor which result from deformities of the pelvis and malpositions and obliquities of the uterus.

DEFORMED PELVIS.

We have already given a description of what has been termed a "standard pelvis," specifying its internal and external dimensions. Any great departure from this standard may be regarded as a deformity, and may interfere to a greater or less degree, in proportion to this departure, with the natural process of parturition.

It is manifest, also, that a similar disturbance of the progress of labor will be induced if the head of the child be enlarged above its "standard" dimensions; in other words, the labor may be disturbed, rendered tedious, difficult, or impracticable, from a disproportion existing between the size of the head and the passages of the pelvis.

Experience teaches that this disproportion very generally depends not upon the child, but the parent. We have already noticed the causes of dystocia arising from increased dimensions of the head, whether natural or the result of disease; we shall therefore in this article confine our observations to Deformed Pelvis, assuming that the head of the child is of the usual or standard size, measuring three inches and six lines in its bi-parietal diameter. Let it not be forgotten, however, that great allowance must be made in practice, not merely as to the various dimensions of the foetal head, but as to its compressibility. Where the bones of the cranium are not well ossified, where the fontanelles and the commissures are comparatively large, the head will, of course, be far more readily transmitted through a contracted opening than when the bones are well ossified and the commissures unyielding, although the actual dimensions of the head, when not subjected to pressure, are precisely the same.

(386)

PELVES EQUABLY DIMINISHED OR ENLARGED.—All the causes of deformed pelvis are by no means understood; the same varieties as to size exist in the pelvis as in other portions of the skeleton—as the head in some individuals is disproportionably large or small, so it is with the pelvis. We find, therefore, that although it be true, as Bichat has observed, that the size of a female pelvis does not materially differ among women of different stature, yet to this general truth there are very many exceptions. Thus, systematic writers speak of the pelvis being in every respect regularly formed as regards the proportions of its diameters and the configuration of its different portions; but in one case it is unnaturally large, and in the other small, the former constituting the "*pelvis aequaliter justo major*," and the latter, "*pelvis aequaliter justo minor*" of these authors.

The causes are unknown. There is no evidence of prior disease, and no peculiar condition of the osseous tissue which can account for the phenomenon—it can merely be stated that in the one case the development has continued to an excessive degree, and in the other such development has been arrested after the normal configuration characteristic of the female pelvis

Fig. 83.



Equable Diminution of the Pelvis.

has been completed. For, as Professor Nægelè observes, these small pelvises are dissimilar from the male pelvis, and also from that of the young girl; the

straits and cavity of the pelvis are regular, but under the normal size.

Small pelves do not frequently occur; they, of course, may exist in dwarfs, but, as Mr. Rigby observes, may be found in women of the ordinary stature, and where the rest of the skeleton is normally developed. They may not only produce inconveniences and suffering during gestation, but will, if the diminution be considerable, prove very dangerous to the mother and child during parturition. Thus, Professor Busch, of Berlin, reports three cases, in each of which the child perished, and two of the mothers died. In one of these there was a diminution of half an inch, and in the other of three-quarters of an inch "in every direction."

Minor cases of diminution may, however, exist without such unfortunate results; perhaps there are but few practitioners who have not met with cases of tedious labor, where the children have been of normal dimensions, but delivery has been protracted from the small size of the pelvis. The author has met with several such instances in which, though artificial assistance was required, yet in all cases the mother did well, and very generally the child was preserved.

Many evils, according to authors, may result from too great *amplitude of the pelvis*, during gestation and

rus sinks prematurely into the cavity of the pelvis, and may even be protruded externally.

These and similar accidents of greater or lesser importance may possibly occur in cases of enlarged pelvis. The scientific practitioner can so readily prevent or moderate them that no serious consequence need at any time be apprehended, and most females would deem themselves well compensated for all such minor troubles by the ease and rapidity with which labor is consummated.

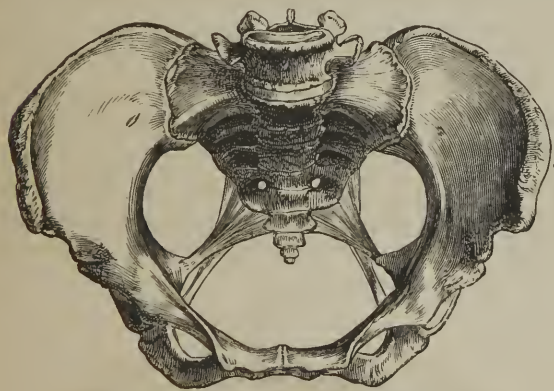
PELVES IRREGULARLY CONTRACTED.—The second and far more frequent variety of deformed pelvis is where the natural configuration of the bones is so altered that the passages are irregularly contracted, rendering labor difficult or impracticable.

The *causes* of such deformed pelves are *predisposing* or *exciting*. Among the *predisposing* may be enumerated,

First. The natural condition of the bones of the pelvis and of the epiphyses at the time of birth and in childhood. However healthy the child may be, nevertheless, if powerful pressure should be frequently or constantly made upon the bones during their period of development, and especially before ossification is completed, deformity will necessarily result in proportion to the degree and persistence of such pressure, even where there is no disease existing. As the development of the foot of a Chinese girl is prevented or altered by pressure from bandages, etc., so also the pelvis of a child may be restricted in its growth, or altered in its form by constant pressure from without. Examples will be given in speaking of the exciting causes of deformed pelves.

Second. The second predisposing cause of deformity, which is thought to be far more frequent, is rachitis, or that peculiar condition of the economy chiefly existing in childhood, where there is a great deficiency of osseous matter in the bones, which, therefore, remain more or less of a cartilaginous or gelatinous character. If this state exists in early life, it is manifest that, from almost any cause, alteration of form may be readily produced. Rickets may be partial or general. M. Guerin says it commences below and extends upward, and that there may be deformity in the legs or even in the thighs, where the pelvis is not involved, or even when the hip-bones are distorted, the spine, ribs, etc., will be unaffected. Not unfrequently, however, all the bones of the skeleton are more or less involved. This disease is often fatal, but in many instances it is arrested, and osseous deposits occur so freely that the bones subsequently become as dense and hard as if no prior disease had existed, although subsequent devel-

Fig. 84.



Equable Enlargement of the Pelvis.

labor, such as prolapsus, retroversion, and partial or complete procidentia uteri, and the late ascent of the uterus out of the pelvis during gestation; its disposition, during the first stage of labor, to sink low before the os uteri is dilated, and the great rapidity with which a child is born after this dilatation is effected, endangering, it is said, the life of the child from its sudden exit when the mother is in an erect position, and also favoring a disposition to inertia of the uterus, floodings, etc. After delivery, also, the contracted ute-

opment of the skeleton is much retarded. Hence, persons who have suffered from rachitis in childhood are generally small as well as deformed. This observation applies also to the bones of the pelvis, the pelvis being smaller as well as altered in form.

Third. The third predisposing cause is malacosteon or mollities ossium. This form of disease may come on at any period of life after puberty. Its essential character is similar to that of rachitis, inasmuch as the osseous depositions, which had previously been abundant, are now very imperfect, so that the bones gradually return to their flexible and cartilaginous condition. This process may go on very gradually, without much detriment, sometimes, to the patient's general health: thus a woman in her first or second labor may have no difficulty in the delivery; but in a third labor, the forceps or turning may be demanded, while, in a fourth or fifth, embryulcia or the Cæsarean section is requisite for the salvation of the mother.

The bones, in some instances, are said to become so soft that their shape can be even altered during labor. Sprengel reports cases from Homberger and Hasslocher where the children were safely delivered with the assistance of the forceps, although the sacro-pubic diameter did not measure more than two and a quarter inches, owing to the yielding of the sacrum under pressure.

In cases of mollities ossium, the actual weight of the bones is very much diminished; Rigby mentions a case where a pelvis did not weigh more than "a few ounces."

The *exciting causes*, of course, are various, and may produce deformities, even when no predisposition exists. Thus, malformation of the pelvis may be induced by falls and blows, causing dislocations or fractures. Dr. Bedford details a case of a woman, where each of the symphyses of the pelvis were dislocated, in consequence of the wheels of an omnibus passing over her body. Fractures also of the bones, especially when not properly attended to, will give rise to serious changes in their form. Cases are also upon record where diseases of the acetabula have existed, as in coxalgia, and, from caries and ulceration, the head of the thigh bone has projected into the pelvis, or where at least the planes of the ischia have been made prominent.

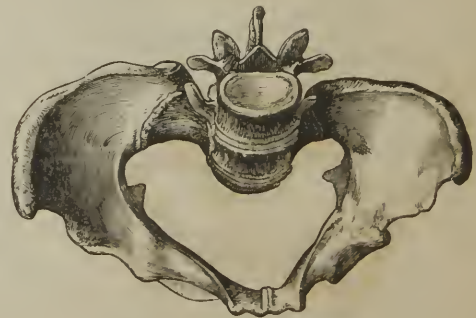
Generally, however, some predisposition exists, and then pressure, whether gradually or suddenly made, may be regarded as the chief exciting cause of deformities; the ductile bones of the pelvis being moulded into various forms, according to the direction and degree in which pressure is applied. Thus, for example, when there is no other predisposition than that which always exists in early life, deformity may be produced

by pressure upon the exterior of the pelvis. Cazeaux quotes Sedillot's account of a very interesting case of double congenital dislocation of the thigh bones, where their heads were lodged against the bones of the ilia, causing, as the child grew, increased depth of the pelvis from a preternatural elevation of the crests of the ilia, also a diminution of the transverse diameter of the superior strait, and an elongation of the sacro-pubic; while, in the inferior strait, the transverse diameter was enlarged, and the coccy-pubic contracted. Similar changes may occur, if the dislocation happens after birth. Of course, if the dislocation be upon one side only, the alteration will be partial. We have cases also detailed in which, from a shortening or paralytic condition of one limb, or where, from amputation of the limb or any similar cause, the child has been forced to use crutches, deformities of the pelvis resulted. The sound hip being larger and more elevated, while the affected hip was smaller, lower, and often deviated.

Various changes also are often produced in growing children by long confinement in particular postures or positions. Thus children, in manufacturing establishments, obliged to stand or sit for many hours, often acquire peculiar distortions from the effect of pressure so persistent in one direction.

It is, however, in cases of predisposition from rachitis or mollities ossium that we shall perceive the most decided effects of pressure in producing deformity. The varieties as well as the degree of such deformities will, of course, depend on the amount of flexibility of the bones, and the direction and constancy of the pressure applied. It is conceivable, for example, that a child suffering from rickets, remaining constantly upon his back, even for a long time, may have no great deformity of the pelvis, unless the bones be very soft, in

Fig. 85.

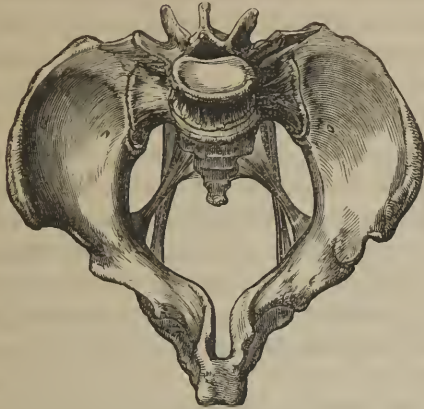


Pelvis Irregularly Contracted.

which case the posterior part of the pelvis will become more flat than usual. If, however, the child lie continu-

ally on one side, that side of the pelvis will necessarily be diminished, while there will be no great deformity

Fig. 86.

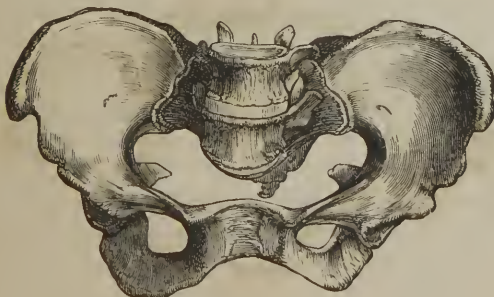


Pelvis Irregularly Contracted.

upon the opposite portion. If, however, the child should lie alternately upon the right or left side, both sides of the pelvis will be diminished, while the pubis may project forward; in other words, the transverse diameters of the pelvis will be diminished, while the antero-posterior ones may be elongated. This constitutes the second type of Dubois, "compression of the lateral walls." It is said to be comparatively very rare.

If, however, a child with rachitis be kept very constantly in a sitting posture, the whole weight of the body being communicated to the sacrum through the medium of the spine, it will be projected forward toward the pubis, diminishing the sacro-pubic diameter, while the bones of the ilia, firmly joined to the sacrum by the sacro-iliac ligaments, will be drawn forward with the sacrum, and their posterior portions will become more convex. The pressure also communicated to the anterior part of the pelvis, from the spine,

Fig. 87.



Pelvis Irregularly Contracted.

and through the ilia, will have a tendency to diminish the concavity of the anterior part of the pelvis, which

will, therefore, become more flattened. This constitutes the first of the systematic divisions of Dubois, or the "flattened pelvis." By this weight also, the sacrum is not always projected directly forward, but sometimes to one side or the other. Hence the superior strait from this projection of the promontory of the sacrum is altered in its form. When the sacrum projects directly forward, both sides of the strait are equally diminished, and it is narrowed in the middle. This has been called a "kidney-shaped strait;" while, if the sacrum projects to one side, then the right or left portions of the strait may be very much contracted.

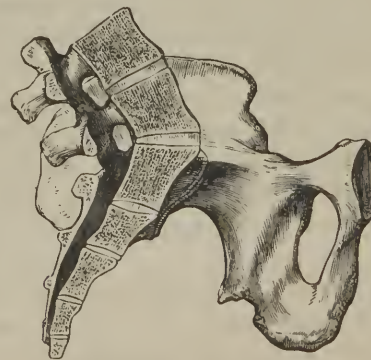
Fig. 88.



Pelvis Irregularly Contracted.

It is evident in such cases that the cavity of the pelvis will also be contracted, at least in most cases. Sometimes, if the diminution of the anterior or posterior diameter be not great, the cavity or outlet of the pelvis will be normal, but generally the sacrum is drawn forward, so that the antero-posterior diameter of the pelvis is lessened. The sacrum often becomes straight, while, in some instances, it becomes more concave,

Fig. 89.

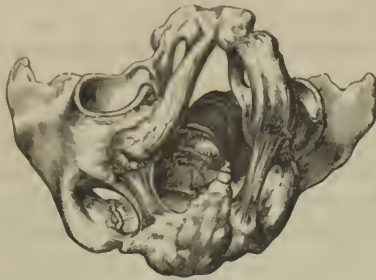


Straightness of the Sacrum.

owing to the fact that while the upper part of the sacrum is pushed forward by the weight from above, the inferior portion and the coccyx are drawn forward

by the sacro-sciatic ligaments, thus diminishing the coccy-pubal diameter of the inferior strait. The trans-

Fig. 90.



Pelvis Irregularly Contracted.

verse diameter of the inferior strait is also frequently diminished when the child is kept long in a sitting posture, and generally the deformity is greater upon one side than the other, as pressure is often made in an oblique direction on the bones of the ischia. In all such instances, the arch of the pubis loses its natural configuration, becoming more narrow and angular, as in the male subject.

If children affected with rickets are often in the erect position, other modifications of the pelvis ensue. The pressure from above, received through the sacrum and the bones of the ilia, is propagated to the acetabula, where resistance is necessarily made, when the child is erect, by the heads of the ossa femorum. In consequence of this resistance, the anterior and lateral portions of the pelvis are pushed inwardly toward the sacrum. Hence, the anterior inclined planes of the pelvis, instead of remaining concave, become flattened, or even convex internally; thus diminishing the sacro-acetabular diameters, sometimes in a regular proportion, but, most frequently, the right or left of these diameters is lessened more than its fellow, especially when the promontory of the sacrum deviates from the middle line more to one side than the other. It will be found, also, in such cases, that the horizontal rami of the pubis approximate each other, leaving but a small space between them, and, thus, still further diminishing, in a practical point of view, the sacro-pubic diameter of the superior strait. The cavity of the pelvis and the inferior strait have their diameters also diminished, so that contraction exists in every portion of the pelvis, especially at the brim, constituting, probably, the most serious deformity met with in practice. By the projection of the sacrum and of the planes of the ischia, the elliptical form of the superior strait is entirely altered. When, however, the promontory of the sacrum deviates to one side, two irregular openings exist on each side of the pelvis, one

being longer than the other. This is the third type of Dubois, termed "Depression of the Antero-Lateral Walls."

What is true of the effects of pressure in rachitic children, is virtually the same in cases of mollities ossium in adults. It is, however, important to bear in mind, that while the deformity arising from rickets is in the adult woman stationary, ossification having been completed, and the disease virtually terminated; yet, in mollities ossium, the disease may still be progressing, and, of course, the deformity increasing. Hence, because a woman is delivered easily in one or two labors, it cannot be assumed that subsequent labors will be as favorable. On the contrary, they may be far more dangerous and difficult from the continually increasing deformity.

The above remarks of the *modus operandi* of pressure in producing deformity of the pelvis, are given merely to illustrate the general characters of such deviations, and the types which learned pathologists have described. Of course, it is impossible to specify the varieties that exist in each type. They are exceedingly numerous; hence, individual cases must be most carefully and accurately investigated by the practitioner, as they may be presented at the bedside.

Fig. 91.



Oblique-Oval Pelvis. (Nægelè.)

M. Nægelè, however, has described another variety of deformed pelvis, where he believes there has been no predisposition existing, and where there has been no actual disease in the bones. He considers it as an "original defect of organization." When the pelvis is examined, the bones are found, as to their density, their whiteness, and their weight, very similar to those of a healthy pelvis. The great peculiarity of this deformity is, that there is a deficiency of development of one half the sacrum, and the whole of one os innominatum; thus, one-half of the pelvis is smaller than the other. Hence, the depth from the crest of the

ilium to the tuber ischii, is less upon the affected side, and the semi-circumference of the superior strait of the same side is also diminished. Nægelè states, that in all the specimens he has seen, there is no sacro-iliac symphysis; ossification there existing, so that the sacrum and ilium constitute, as it were, but one bone. Cazeaux, however, thinks that there is no necessary connection between this ossification of the symphysis and the want of proportional development of one-half the pelvis, as he has seen cases where the sacro-iliac symphysis remained, and, yet, all the other characteristics of this accident existed.

The deformity resulting from the comparatively slow and imperfect formation of one-half of the sacrum, and of the os innominatum upon one side of the pelvis, consists,

First, In the deviation of the last lumbar vertebra and the promontory of the sacrum from the middle line to the affected side. Hence, the symphysis pubis is not directly opposite to the promontory of the sacrum. A line drawn from the promontory directly forward would strike the linea pectinea, or spine of the pubis, one inch or more, on the side of the symphysis. The sacro-pubic diameter would, therefore, be oblique, and is usually shortened as compared with the normal pelvis.

Second. The proportion of the oblique diameters to each other is also altered; that extending from the ankylosed symphysis to the opposite acetabulum being much diminished, and the oblique diameter upon the opposite side is much longer, although both diameters are diminished. Thus, in one pelvis the short oblique from the ankylosed side measures three inches and five lines, and the other oblique four inches and seven lines. In the same pelvis the sacro-acetabular diameter, upon the affected side, was one inch and ten lines, while upon the opposite side it measured three inches and six lines—these measurements clearly designating the contraction of the pelvis on the diseased side. This is confirmed also by the diminished length of the semi-circumference of the superior strait upon the one side, as compared with its opposite. It will be found also that the oblique diameters in this pelvis do not cross each other at right angles, as in healthy pelvises.

Third. There is also some deformity on the non-ankylosed side of the pelvis. This is shown chiefly by a greater concavity of that portion of the superior strait formed by the sacrum and the posterior part of the linea ilia; while the anterior portion, as formed by the linea pectinea and the anterior part of the linea ilia, is less concave than natural. Hence it results,

Fourth, From all these changes, that the whole form of the superior strait and its plane is altered from that

of an ellipse, with its long diameter transverse, to that of an oval, where the long diameter corresponds to an oblique diameter of the superior strait. Hence, M. Nægelè has termed this peculiar deformity which he has so well described, the "*oblique-oval pelvis*."

Fifth. It will be noticed also that there is a proportionate diminution of size in the cavity of the pelvis and at the inferior strait—the diameters being lessened and the arch of the pubis losing its rotundity, becomes more angular, as in the male subject. Thus, in the pelvis above alluded to, where the oblique diameters measured respectively four inches and seven lines and three inches and five lines, the bis-ischiatric or transverse diameter of the inferior strait measured but three inches.

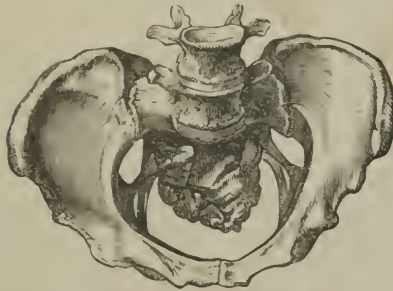
M. Nægelè observes that perhaps a good idea may be gained of this deformity on the supposition that pressure had been made against the affected side from below upward, and also in a lateral direction. Indeed, as Cazeaux says, it forms but a variety of those contracted pelvises arising from lateral pressure, and at the same time from a "depression" of the anterior wall upon one side. Such a state of things we might imagine would occur in a young child who was long confined to bed, lying upon one side, and occasionally allowed to sit or stand in such a position as to interest only one side of the pelvis; under such circumstances it may be supposed that one portion of the pelvis might be developed, while such development and the consequent deformity would be prevented on the compressed side; and it is possible that such constant pressure might explain the ankylosed condition of the sacro-iliac symphysis, the cartilage being absorbed and osseous union ensuing.

We very cheerfully acknowledge our indebtedness to the European writers for nearly all the information, theoretical and practical, of these untoward conformations of the female pelvis. For, as Dr. Dewees has remarked, and the observation has been confirmed by his successors, American women seldom suffer from deformities of the pelvis. Rickets is a very rare disease among our children; malacosteon in adults is almost unknown; indeed, this last has been chiefly observed in England, so that the Continental writers often term it the "English disease." Children also in the United States are very seldom confined for hours together in particular postures, in manufacturing establishments, and very universally are furnished with good substantial diet, and enjoy the benefit of active exercise in the open air. Hence, all those deformities contracted in childhood from long confinement in special postures and in close, ill-ventilated apartments, with often a scanty supply of nutritious food, are comparatively unknown on this side of the Atlantic. We meet

occasionally a pelvis somewhat contracted, ("pelvis æqualiter justo minor,") but seldom rendering parturition dangerous to the child, and still less frequently to the mother. The examples of deformed pelvis generally, therefore, occur among foreigners, and of course the number is limited, and the experimental knowledge of the American accoucheur cannot be very extensive; although in our large cities he may meet with some cases sufficient to test the practical directions laid down by experienced European writers, and thus form a better estimate of their real value.

Obstacles to delivery are, however, not always de-

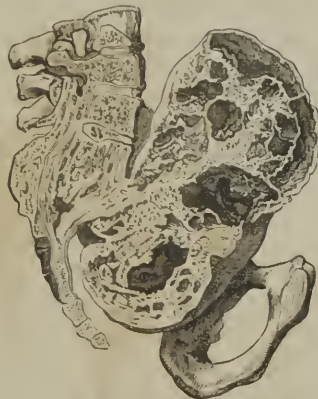
Fig. 92.



Exostosis of the Pelvis.

pendent upon simple malformation. Sometimes the passages are contracted from *osseous tumors* projecting into the cavity of the pelvis, to a greater or less degree, so as partially or completely to obstruct

Fig. 93.



Exostosis of the Pelvis.

the progress of the foetus during delivery. Such exostoses in the pelvis are, however, very rare. They are said to be observed more frequently in the region of the sacrum, occasionally at the sacro-iliac symphysis, and sometimes at the anterior portion of the pelvis. Their existence can generally be recognized very rea-

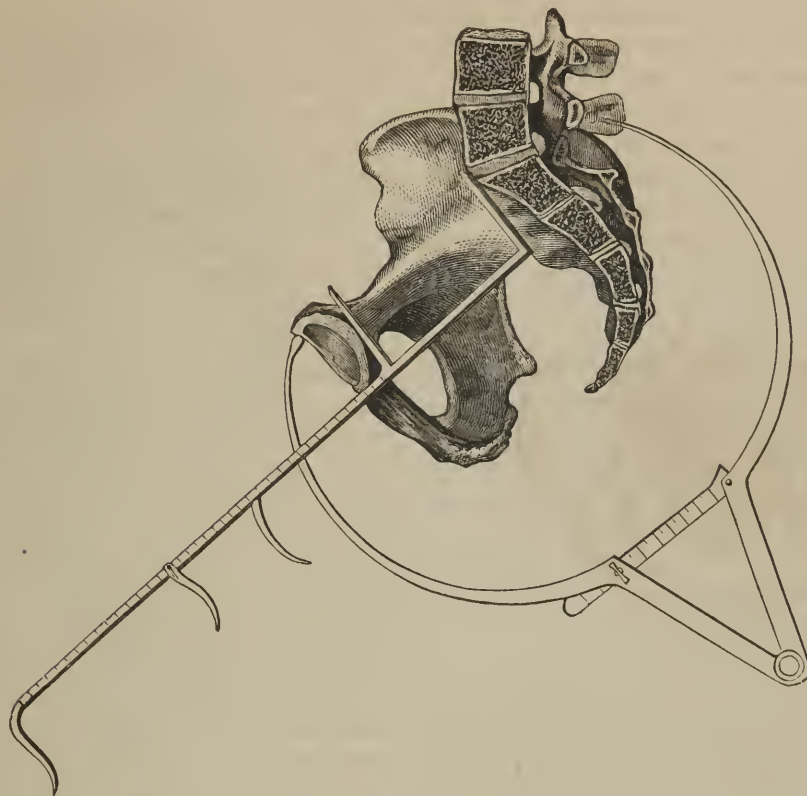
dily by their hardness, irregularity, and immobility. Care, of course, should be taken—if the examination be made during labor—not to confound them with the head of the foetus, and also some attention may be requisite to distinguish between an exostosis and a calculus in the bladder, especially as such calculus has, during labor, in some degree been kept immovable by the pressure of the head of the child. It can generally be diagnosed by its mobility, and also by means of a "sound" or catheter introduced per urethram.

Numerous other obstructions will occasionally be met with, which will render the labor tedious, difficult, or impracticable, without artificial assistance. We shall have an opportunity of alluding to many of these complications in the sequel.

Diagnosis of Deformed Pelvis.—Although in general it is a very easy matter to distinguish a deformed pelvis in the living subject, yet minor degrees of deformity can only be ascertained with great difficulty; and in all cases a very exact measurement of the contracted apertures will be almost impossible. In practice our difficulties will be enhanced by our ignorance of the exact size, and also of the degree of compressibility of the child's head, which so constantly differ in the children of different women, and even in those of the same woman. Assuming, however, that the child's head has the usual mobility of the bones of the cranium, and the ordinary dimensions, as already detailed, every attention should be paid to ascertain what space exists for its passage through the pelvic apertures. Many physicians have placed great confidence in the external measurement of the pelvis; but this is liable to many errors, even from the varying condition of the external tissues, and can in no case give any exact idea of the form or dimensions of the pelvic cavity. Baudelocque, for example, proposes apparently, upon very excellent ground, by means of callipers, to measure the exact distance of the antero-posterior diameter of the pelvis externally, from the anterior face of the symphysis pubis to the spinous process of the upper bone of the sacrum, which can be very generally felt near the skin, even in corpulent persons. In normal cases, this, very universally, according to Baudelocque, measures seven and a half inches, from which should be deducted two and a half inches, the thickness of the sacrum, from the promontory to the spinous process, and also half an inch as the thickness of the ossa pubis, leaves four inches as the length of the sacro-pubic diameter of the superior strait after allowing half an inch for the soft tissues. Hence it is inferred that if the callipers, as above applied, give but six and a half inches, the conjugate diameter of the superior strait would measure

but three inches, and so in proportion in other cases. No doubt this occasionally may be very exact; but owing to the promontory of the sacrum often projecting obliquely forward, to alterations in the form and direc-

Fig. 94.



Application of Callipers and Pelvimeter.

tion of the sacrum itself, but especially to the changes which take place in the form and direction of the pubic bones, (as observed in Dubois' third type of "depression of the antero-lateral walls" of the pelvis, Fig. 90, on page 390,) all dependence upon Baudelocque's method must be more or less futile. Practitioners, therefore, depend almost exclusively upon internal examinations, in order to ascertain the extent, the character, and the degree of pelvic deformities.

This internal examination is most satisfactorily made by the finger of the educated and experienced practitioner, although numerous instruments have been devised for this purpose. By it the accoucheur can ascertain at once the general character of the deformity, whether it be uniform upon both sides of the pelvis, or whether one side be more contracted than the opposite, whether the constriction involves simply the superior strait, or also other portions of the pelvis, whether the sacrum be more or less concave than usual, whether the coccyx has receded or advanced toward the pubis, whether the arch of the pubis has become contracted and angular, and whether the sides of the pelvis or

Fig. 95.



Measurement by the Index Finger.

the tuberosities of the ischia have approximated to or receded from each other, etc., etc.

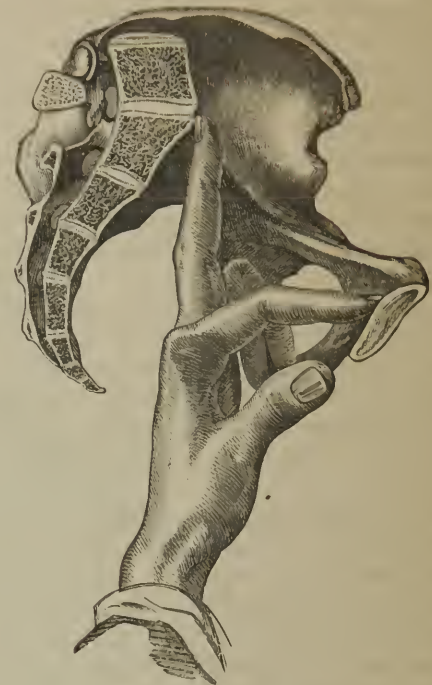
This information can be obtained by the index finger passed into the vagina, with its radial side anterior, and its point directed toward the promontory of the sacrum. If the projection of the sacrum be somewhat greater than natural, it can generally be felt, especially if examination be made during labor, or in women who have previously borne children. If this can be accomplished, the practitioner can readily measure, on his finger, the distance from the promontory of the sacrum to the triangular ligament of the pubis, which will give the hypotenuse of a triangle, one side of which subtends the length of the symphysis pubis, and the other extends from the pubis to the promontory of the sacrum. It is found generally—admitting, of course, some exceptions—that the difference between the two long sides of this triangle will be half an inch. Hence, if the practitioner recognizes that the sub-sacro-pubic diameter measures three and a half inches, he may infer, with considerable exactness, that the sacro-pubic diameter of the superior strait is but three inches. In this way also, he can very accurately measure the distance between the top of the arch of the pubis to the centre of the sacrum, and also to the extremity of the os coccygis, especially if there be a diminution of the antero-posterior diameters of the cavity of the pelvis, or of the inferior strait. There will be no great difficulty in ascertaining the space between the tuberosities of the ischia and the lower portions of the pelvis by similar investigations.

Another mode has been proposed by introducing the hand into the vagina, and placing the extended fingers between the pubis and the sacrum, the radial side of the index finger being next the symphysis pubis. The practitioner then can judge of the space between the pubis and the sacrum according to the number of fingers employed, and the height to which they may be extended; the breadth of the fingers at the points concerned being afterward carefully measured. This operation is very seldom, however, practicable; in primiparous patients, even during labor, it could not be accomplished; it will be difficult even in women who have borne many children, and also will be impracticable in those cases where the child's head partially projects through the superior strait. Professor Simpson suggests the employment of chloroform to render the operation more practicable, and less severe.

Dr. Ramsbotham strongly recommends the use of the two fingers, employing them as a pair of compasses. Thus the middle finger can be passed to the superior strait, so as to touch the promontory of the sacrum; while the index finger may be turned forward, so as to

touch the symphysis pubis; then by keeping the fingers steadily in their same relative position, they may

Fig. 96.



Measurement by two Fingers.

be withdrawn from the vagina, and the distance between their extremities, now representing the sacro-pubic diameter of the strait, may be carefully measured. With all deference to the opinion of Dr. R., and confidence in his skill, we must believe that few persons could keep their fingers steady enough to secure exactitude by the above mode of measurement, especially if more or less pressure be made upon the fingers during their extraction from the orifice of the vagina. One advantage of using the fingers as compasses over the introduction of the hand, according to Dr. Ramsbotham, is, that it may be employed when the head has partially entered the aperture of the pelvis.

Many pelvimeters have been devised in order to obtain a more accurate knowledge of the degree of deformities of the straits of the pelvis: that of Contouli's has received the most attention, but it is practically of little importance in the living subject, and has fallen very much into disuse in Europe, and perhaps has hardly ever been employed in America. It resembles very much the shoemaker's instrument for measuring the foot, having two metallic uprights, each connected with the rod at right angles, and sliding upon it. Being introduced into the vagina, the me-

tallic portions are placed one in contact with the sacrum and the other at the pubis, and the distance between them can be ascertained by a scale on the rods exterior to the vagina. (Fig. 94, on page 393.)

Consequences of Deformed Pelvis.—Women who have recovered from rachitis or from mollities ossium, generally, under favorable circumstances, enjoy excellent health; their organic actions being good, and no other inconveniences resulting than those necessarily arising from the curvatures of the spine, limbs, etc. There is a want of proper symmetry in the figure, and there are defects in the carriage and motions of the patient, so that progression is sometimes awkward, difficult, or actually impossible.

When from these or any other circumstances deformities of the pelvis may be suspected, it will be unadvisable for such individuals to marry; at least not before proper professional examination is made of the pelvis, to determine, as far as practicable, whether the deformity be so great as to prevent the delivery of a living child.

In all cases where the pelvis is actually or relatively contracted, some inconveniences, accidents, and sufferings may result during pregnancy. Thus, in the early months of utero-gestation, there is a greater *liability to abortion* as there is less room for the development of the uterus in the cavity of the pelvis; and there must also be a greater predisposition to prolapsus and retroversion of the uterus, thus also increasing the disposition to miscarriage. This may be aggravated by the fact that the superior strait is proportionately more contracted than the cavity of the pelvis, and hence the rising of the uterus out of the cavity will be greatly resisted, or actually prevented, and of course abortion will be inevitable. After the fourth month of utero-gestation, the inconveniences and suffering incident to pregnant women will generally be aggravated, especially when the promontory of the sacrum and the lumbar vertebræ are very prominent. Hence, there will be greater distension of the abdominal parietes, giving rise to soreness, pain, increased disposition to umbilical and ventral hernia, irritations of the bladder, varicose enlargements of the veins of the pelvis and lower extremities, and also anasarca. Right or left lateral obliquities of the uterus will be more frequent, and more inconvenience to the stomach, liver, viscera of the chest, etc., will arise from the upward pressure to which they are subjected; there will also, from the same cause, be a greater predisposition to *premature labor*.

Notwithstanding these and analogous sources of mischief, the deformed woman will often retain her child to the full period of utero-gestation.

Experienced accoucheurs have remarked that in cases of deformed pelvis, *mal-presentations* of the fœtus are more frequent than in normal cases; this would of course increase the difficulties and dangers of parturition, already very great. It may, however, be observed, that such mal-presentations are not very common in minor cases of deformity; and moreover, that after the bearing-down efforts are established, many of them are spontaneously rectified by the pressure to which the fœtus is subjected, especially by increasing flexion of the head, etc.

The bad consequences likely to occur during labor must vary exceedingly, according to the disproportion which exists between the head of the child and the passages of the pelvis; perhaps it may be said, *cæteris paribus*, that the more contracted the apertures, the greater force is required to effect the entrance or transmission of the fœtus. We will, for the purpose of illustrating the dangers to which the mother and the child may be exposed, consider these deformities under three general divisions.

First. When there is at least three inches in the antero-posterior diameter of the superior strait, by three and a half inches in the lateral.

Second. Where this short diameter varies from two to three inches; and,

Third. Where there is less than two inches between the pubis and the sacrum.

In the *first* degree of deformed pelvis, writers have assumed that a child may be born alive by the spontaneous efforts of the mother. This fact may be taken, therefore, as the foundation of many important rules of practice; but it seems to be forgotten too frequently that if there be but three inches, or even three and a half inches in the conjugate diameter, that a very large proportion of the children will perish, and the mothers be subjected to great suffering, often to positive injury of the tissues of the pelvis, and it may be, to the loss of life.

In such cases the *dangers to the child* arise from the continued pressure to which it is exposed by the powerful efforts of the uterus, and the resistance to its descent. The effect of such pressure upon the cranium, the brain, and especially on the circulation of the blood in the body of the child, in the cord and placenta, are well known. We have already expressed the opinion that the death of the fœtus in difficult labors more frequently arises from the pressure upon the cord and the placenta, interrupting their functions, than simply from the pressure upon the brain, which last organ is of comparatively little importance to the uterine life of the child. Of course, however, if the compression of the head be so great as to produce lesion

of the brain or effusion within the cranium, then the child will probably perish even if the placental functions continue to its birth. Of course it is impossible to estimate the degree of compression which may be endured, or the length of time which may transpire with impunity to the child in cases of labor. There are many instances where every indication of active life existed at the beginning of labor, and yet after comparatively a short period the child was still-born, while in others, where the mother's efforts have been powerful, the labor exceedingly tedious, the child has been born alive, even when the whole form of the head has been greatly altered. The high authority of Baudelocque is adduced for the extraordinary fact that a child at term was born alive through a pelvis measuring but two and three-quarters inches in the short diameter of the superior strait, while the form of the head was so altered that the occipito-mental diameter was extended even to eight inches.

The dangers to the *mother* are, however, very great. Locally, she suffers from the effects of the pressure on the soft tissues covering the bones of the pelvis, which pressure is in direct proportion to that required for the diminution of the child's head, for its transmission through the contracted aperture. The bearing-down efforts of the mother, forcing the child into a contracted opening, have not the direct, but the indirect, effect of lessening the head. The direct compression is necessarily made by the bones, as covered by the soft tissues, and, therefore, is greater, in proportion either to the size of the head or to the smallness of the strait. All are familiar with the consequences of continued and severe pressure upon living tissues, such as contusion, laceration, partial or complete interruption of the circulation, and the subsequent inflammation, suppuration, ulceration, and mortification which so frequently ensue, according to the degree and persistence of such pressure. In the cases now under consideration, generally, the head will partially enter the superior strait, and occasionally, after more or less injury to the mother's tissues, may be transmitted; but, in other instances, it will be arrested at the superior strait. Even after the most prolonged and powerful bearing-down efforts, it may remain immovable between the pubis and the sacrum, constituting what is called the "impacted," or "locked," head. It is a case of impracticable labor, so far as nature's efforts are concerned; and child and parent will both perish without artificial aid.

By the assistance of art, however, the mother may be saved, and, perhaps, even the child, under these dangerous circumstances; but, if the impaction has existed for any length of time, great injury will be

sustained by the mother's tissues,—inflammation is, often, very excessive, involving, it may be, the neck of the uterus, the vagina, the bladder or urethra, the rectum, etc., etc.; and not unfrequently, as a consequence of such inflammation, or more directly from the great degree of pressure arresting the circulation, sphacelus ensues, followed by sloughing to a greater or less extent. Such sloughs frequently involve the urethra and bladder, occasionally the rectum, sometimes the uterus, and may even extend so deeply as to involve the peritoneum, covering the uterus or vagina. Too frequently, the mother perishes from the extent of such inflammatory and ulcerative processes, while, in other instances, she may survive, but be left with the horrible inconveniences and sufferings connected with vesico-vaginal, or recto-vaginal fistulæ or openings. The author has seen one case in which all the bladder was destroyed, excepting the superior portion or fundus, which became inverted, and appeared as a pouch in the vagina, and often at the vulva.

These local injuries to the mother have often been attributed to the use of instruments, or other means of artificial delivery; but they, in reality, result, far more frequently, from the want of timely assistance, arising from the culpable ignorance or timidity of the practitioner. As already intimated, such injuries may be the immediate cause of the death of the mother; this seldom occurs, perhaps, during labor, but, usually, in the course of a few days or weeks after its termination.

Death during labor, in such cases of impaction, is more frequently the result of the direct exhaustion of the vital power. The violent contractions of the uterus and of the abdominal muscles cannot be endured, beyond a certain length of time, with impunity. The nervous energies of the patient become prostrated, and soon, after some fitful efforts of reaction, the circulation collapses, and the complete exhaustion and death of the patient ensue. This result may be hastened, in some instances, by the occurrence of local inflammation, and especially by the putrescency of the fœtus still in utero. In other cases, the death of the parent may be hastened by the rupture of the uterus, with the usual terrible consequences of hemorrhage, collapse, etc.

In addition to the above evils connected with deformed pelvis during labor, authors have generally noticed that the first stage is apt to be tedious and imperfect; in other words, that the os uteri dilates slowly, and frequently the dilatation is not completed. In such cases, it will generally be found "dilatable" under the effect of pressure from the child's head or the hand of the practitioner.

Second. Where there is less than three and more than two inches in the conjugate diameter of the pelvis. Labor under these circumstances, with few exceptions, must be regarded as hopeless, for the mother or child, by the natural powers. We have already mentioned exceptions where children, at term, have occasionally been born when the antero-posterior diameter was below three inches; and, of course, such favorable deliveries may be more frequently anticipated in cases of twins, and also in premature labors. But these exceptionable cases do not alter the general truth, that labor at term, under these circumstances, should be regarded as impracticable by the natural efforts. Neither is this truth invalidated by the fact that dead fœtuses—which have been long macerating in the liquor amnii of an unbroken ovum, or where, atmospheric air having been admitted, actual putrefaction has taken place—have been delivered, without difficulty, through very contracted apertures.

The causes of death of the child and of the mother, in these examples of impracticable labor, are precisely the same as those already detailed under the first division: excepting, perhaps, that death generally ensues from collapse of the vital functions, rather than from the slower processes of inflammation and sloughing.

Third. Where labor occurs when the conjugate diameter of the superior strait measures two inches or less. It is manifest, in these cases, that labor is absolutely impracticable. The child and the mother will necessarily perish without artificial assistance. The immediate causes of the death of each will be readily understood from what has been already stated.

Treatment of Labor in Deformed Pelvis.—The treatment must be modified according to the divisions just mentioned.

I. Cases of great deformity where the short diameter does not measure at least two inches.

By reference to what has been said under the head of gastrohysterotomy, it will be seen that all such cases of deformity demand the Cæsarean operation, if the child be alive. The conjoint experience of the profession confirms the opinion that although there be many wonderful escapes for the mother when craniotomy has been resorted to, where there has been only one and a half inches in the short diameter, yet that the dangers to which the mother has been subjected are fully equal to those of the Cæsarean section. Therefore, considering the mother alone, the section of the uterus is at least as favorable as craniotomy, while it affords the great additional recommendation of presenting an excellent chance for the preservation of the child. The remark should be repeated,

that the practitioner should never, if practicable, delay this operation of hysterotomy until the membranes are ruptured and the os uteri fully dilated; as soon as the diagnosis is established and the os uteri partially dilated, the operation should be performed while the tissues of the mother and the general system are in good condition, and before the child has been in any degree injured by the uterine contractions.

If the child be dead at term, and all its tissues firm, hysterotomy will be justifiable for the sake of the mother; but if the child has been dead for some time previously, craniotomy should occasionally be preferred, provided there be an inch and a half in the short diameter, inasmuch as the infant is not fully developed under such circumstances, and especially as, owing to its maceration in the liquor amnii, its tissues have been softened, the bones of the head even are movable, so that those of the base of the cranium and of the face may be separable, as in the extraordinary case of Professor Simpson, where a child of some seven or eight months' development was spontaneously delivered through an opening measuring half an inch by three inches.

II. Where the deformity is above two inches and not more than three inches.

Notwithstanding all that has been written by the wisest and most experienced men in the profession, the question is still unsettled as to what ought to be our practice in such cases.

If the child be dead, there is no question as to the propriety of perforation and delivery, *secundum artem*.

If, however, the child be alive, and the mother and infant in good condition, what should be the ethical and professional duty of the medical attendant?

Symphiseotomy was formerly urged upon the profession as being precisely adapted for such cases; but experience has decided that its dangers are equal to those of the Cæsarean section, both as regards the mother and the child.

The question, therefore, is to be decided whether hysterotomy or craniotomy should be employed: the former giving a prospect of safe delivery to mother and child, but involving the parent in most imminent danger; while the latter, in the cases now contemplated, presents comparatively few dangers to the mother, while the child is necessarily sacrificed.

We have already expressed the hope that under an enlarged experience and the best application of improved scientific principles, that the operation of gastrohysterotomy may soon be executed with more safety to the parent than in times past. The whole weight, however, of authority through the British dominions, and even the general practice upon the continent of Europe, sustained by the high authority of M. Cazeaux,

is decidedly in favor of craniotomy in these unfortunate cases; the life of the mother should not be jeopardized, they say, for that of the infant.

Let it, however, be observed that if there be two and three-quarter inches in the short diameter, the operation of craniotomy should be deferred until forcible pains have existed for some time, in order that it may be determined whether the bones of the cranium may not be so compressible as to allow the head to pass, especially when assisted by the forceps. This, indeed, is a forlorn hope, and the experiment should never be persevered in long enough to endanger the mother's tissues. But it is justifiable, inasmuch as in some rare exceptionable cases the child has been born alive, where there have been two and three-quarter inches in the short diameter. Here, as in all similar instances, the practitioner, after carefully establishing his diagnosis, should speedily determine his course of practice—delay is most dangerous. If hysterotomy is to be resorted to, it should be performed early; if craniotomy is absolutely demanded, no advantage would result from delay. On the contrary, as violent contractions of the uterus exist, and as the child is forcibly impelled against the tissues of the pelvis, the dangers of the mother augment every moment. The more powerful her efforts, the sooner she will be prostrated. The greater the pressure upon the tissues, the more injury they will sustain; and, of course, the more liability to inflammation, ulceration, and sloughing. If there be a *caveat* which ought to be impressed upon the mind of the young practitioner, it should be, beware of delay where there is a disproportion between the size of the head and the canal of the pelvis. We hear and read much of the terrible consequences of protracted labor, and especially of the mischief arising from instrumental assistance. Experienced accoucheurs attribute to the former, inflammations, sloughings, and consequent destruction of portions of the vagina, bladder, rectum, uterus, and even the life of the patient. Instrumental assistance, especially in unscientific hands, has doubtless been productive of great evil, as every one, perhaps, can testify. Nevertheless, the injuries sustained are, with few exceptions, owing to the want of instruments, or artificial assistance of some kind. All surgical assistance should be for the benefit of the patient; and we firmly believe, as regards obstetric operations, when scientifically performed, that they seldom aggravate but often diminish the dangers. The injuries sustained are from inordinate and long continued pressure of the child's head, and not from the application of the instrument.

Hence, if craniotomy be necessary, let it be performed early, and the proper measures be employed

to diminish the size of the cranium, and thus moderate the pressure upon the tissues of the pelvis.

The necessity of delay, however, has been urged in many instances, because the child is still living in utero. This is a specious argument, addressing itself to the conscience of every thoughtful practitioner; *a priori*, it is wrong to destroy human life, even in an unborn infant. But the question in the present case is, whether the mother should perish or be preserved. The child must perish, sooner or later; it is a matter, therefore, of comparatively small moment, whether it be subjected to a lingering death, under the powerful contractions of the uterus, or its death be rapidly induced by the perforator; while, to the mother, it is of the utmost importance that delivery be speedily accomplished, as otherwise her life will be sacrificed. It has been so common for experienced physicians to wait for many hours for the death of the child before craniotomy is performed, that it is no wonder that so many deaths are ascribed to this operation. The result of statistics prove that twenty per cent. of the mothers perish. This great mortality must mainly result from delay, for the operation of craniotomy in itself is very simple, and has the effect of immediately diminishing and eventually removing the pressure from the mother's tissues. It is characterized as an operation "for the mother;" for her welfare, not for her injury.

Moreover, such delays render the condition of the mother so precarious, that it may well be agitated whether the Cæsarean operation, while it will afford the prospect of a living instead of a dead child, would not be as safe for the mother, as the forcible delivery, even of a mutilated foetus, through the contused and inflamed passages of the pelvis of a woman, whose mental and corporeal powers are alike exhausted from severe and protracted sufferings. Certainly, therefore, the practitioner, after mature reflection, and with the assistance of the best advice he can procure, should speedily decide what is due to his patient; if craniotomy be positively demanded, let there be no unnecessary delay from a false sentimentality; if the Cæsarean section be demanded, it is of equal importance to operate in time.

III. Those cases of deformity where the short diameter measures three inches or more.

Much discussion has existed as to the proper management of cases of labor when the pelvis is moderately contracted. On reference to our observations made on the induction of premature labor, it will appear, that where such contractions have been previously known, the woman should not be allowed to go to the full period of utero-gestation, neither for her own sake, nor for that of her infant. If the practitioner, however, be

not called until labor has commenced at term, and the child be alive, the important question should be at once decided as to the proper course of treatment.

To present this subject correctly under its most difficult aspect, we shall suppose that there be only three inches in the antero-posterior diameter of the superior strait, and then consider the several suggestions proposed as best adapted for the safety of the mother and her infant; it being borne in mind that the welfare of both parties will be less endangered, when the short diameter is greater than three inches.

The first proposition is to leave such cases to the *natural efforts*. This is founded on the fact that, in some instances, children have been born alive by the powerful contractions of the uterus, when the aperture did not exceed the dimensions mentioned. The explanation of this extraordinary circumstance is familiar to every accoucheur. The bones of the sides and the vault of the cranium being connected with each other by membranous commissures, are movable, and, therefore, when greatly compressed, they overlap each other to a considerable extent, especially when the pressure is made in a lateral direction. Under such circumstances the bi-parietal diameter may be diminished, as has been proved by observation and experience, to the extent of six lines, and even more, so that where the head measured originally three inches and a half it may be made to pass through an opening even of three inches. In these instances of compression the parietal bones overlap each other, and also the superior edges of the os occipitis, and the anterior edges of the os frontis—these last-mentioned bones sinking below the level of the parietal bones. The superior portion of the occipital bone, also, owing to a transverse epiphysis behind the foramen magnum, has a “ginglymoid” or hinge-like motion backward. Hence the occipito-mental diameter is actually lengthened out by the compression—some authors state to the extent of six or eight lines. Thus the whole form of the head is exceedingly altered, especially as this actual increase of length is apparently augmented by the tumefaction and prolongation of the scalp in the occipital region.

This compressibility of the cranium, from the mobility of the bones, is occasionally augmented in consequence of their elasticity and flexibility. Many practitioners, even in cases of common labor, must have noticed, under the influence of pressure, the bending of the ossa parietalia, which generally rapidly disappears when such pressure is removed, the child sustaining no injury. In some instances, where the pressure has been great upon particular points of the head, a marked depression may remain for some days or even weeks after delivery. Dr. Simpson has collected

some very interesting cases of this character from the writings of Dr. Denman, Dr. Radford, Madame Lachapelle, Dugés, and others. In one case of Dr. Denman's, the depression of the parietal bones measured one inch; in Madame Lachapelle's case the depression was great, and continued for fifteen days after delivery. In all these cases the children survived.

In post-mortem examinations of infants who have perished during labor with or without compression of the bone, the brain has often been found uninjured, and no effusion to have occurred; but in very many, there have been effusions of fluid, serous or sanguineous, and occasionally lesions of the brain itself.

Such are the wonderful provisions made for facilitating the adaptation of the size and form of the foetal head to the passages of the pelvis; even the experienced practitioner is often astonished at the change which has been produced in the form of the head, and still more so at finding that children occasionally survive severe and protracted labors of many hours' duration. The physical explanation of the phenomenon we have already given, but the physiological solution is more difficult. It is thought that the safety of the child in these cases of great compression is due to the fact, that the crura of the brain, the pons Varolii and the medulla oblongata being situated at the base of the cranium are not exposed to pressure, even when the lobes of the brain have suffered from the compression of the head. This, however, is unsatisfactory, as the great pressure made over the whole circumference of the head must be imparted more or less to all the contents of the cranium, and the functions of the whole must be proportionally impaired. We think a much broader ground can be taken upon this subject: the declaration may be made that until a child be born, the brain exercises no important function in the economy; the foetal life is essentially vegetable or organic; its animal life is very imperfectly developed. Numerous facts confirm this point; we need merely refer to cases of infants going to the full period of gestation, and born alive so far as their organic life is concerned, where the whole brain is disorganized, or even entirely absent. In a case which occurred to Dr. Bridges, of this city, to which allusion has already been made, a woman was delivered of twins; the first child was well-formed, healthy, and breathed readily, but was small and emaciated; the second child had a remarkably large body and lower extremities, but the head and upper extremities were entirely absent. Such cases of acephalous children have not unfrequently been observed; the inference is, therefore, justifiable, that no important cerebral function is exercised by the foetus while within the body of its parent; and hence

that compression of the brain, however dangerous immediately after delivery, when the placental life has terminated, is comparatively innocuous during labor, provided always that no serious effusion or lesion has occurred. If such lesions should exist, they may, and often would prove the cause of death by preventing, after birth, the exercise of the cerebral functions so essential to animal existence.

Another inference from the above fact is, that the cause of death in protracted labors is not referable mainly to compression of the brain, but to the injury inflicted on the circulation of blood in the placenta, the umbilical cord, and the body of the child, under long protracted and powerful contractions of the uterus. It is very probable that such contractions, if constant, would rapidly destroy life by interrupting the circulation; but the admirable provision of nature in causing regular suspensions of uterine efforts, so that relaxation succeeds contraction, insures very generally the life of the fetus. The circulation in the cord and placenta, partially or entirely suspended by the bearing-down efforts of the mother, is thus restored, and the placental functions re-established. Let it, however, not be forgotten, that the danger of the child is in proportion, *ceteris paribus*, to the degree and length of the uterine contractions and the duration of the second stage of labor.

From the views now presented, some idea may be formed of the danger to the child in cases of contracted pelvis, and why the danger increases, not merely in proportion to the degree of contraction, but also to the duration of labor, and the vehemence of the bearing-down efforts of the mother. Hence, where but three inches exist in the short diameter of the pelvis, so much time and effort are required to mould the head for adaptation to the passages of the pelvis, that few children can be expected to survive. This supposition is confirmed by actual experience. Although practical authors have laid it down as a fact that a child may be born alive, under the specified degree of contraction, simply by the maternal efforts, yet such cases are of very rare occurrence. Few accoucheurs have been permitted to witness them. Statistics, we believe, have thrown no special light upon this point, and we have a right to conclude that such deliveries are exceptional, and should not be the foundation of a practical rule. In other words, the practitioner ought not to commit such cases of labor, where there are but three inches in the short diameter of the pelvis, to the unaided efforts of nature.

This conclusion, we think, is confirmed by the fact that at the full period of gestation the bones of the head are generally too completely ossified to admit,

without assistance, the requisite degree of compression, and also that in few women will the powers of the mother be sufficiently enduring. After violent efforts of longer or shorter duration, the pains begin to fail, and may entirely cease. All such labors are, moreover, exceedingly dangerous to the tissues of the mother. The constant and forcible pressure against these tissues by the fetus, not only irritates and contuses, but at particular spots diminishes and even suspends the circulation, so that mortification frequently ensues, with all its terrible consequences, often embittering the life of the woman, even if she should survive. This danger is still greater if the head of the child be so far diminished as to be forced completely into the strait and firmly impacted between the pubis and sacrum, and there arrested, being incapable of further descent, or of elevation. This is termed "locked head," and should, of course, be distinguished from a simple "arrest," where the head is still movable.

In view, therefore, of these imminent dangers to the child, and even to the parent, the suggestion of waiting any length of time, when there is but three inches in the short diameter of the pelvis, cannot, we believe, be justified. If, however, there be three and a quarter or three and a half inches, more hope may be entertained; but, judging from our experience, if the pelvis has not at least three and a half inches in its sacro-pubic diameter, a child fully developed will seldom be delivered alive by the spontaneous efforts of the mother. Hence artificial delivery is very generally demanded.

The second proposition is to assist delivery by means of the *vectis* or *lever*. We have already noticed the *modus operandi* of this instrument, and specified the usual circumstances in which it should be preferred. In the cases now under consideration, where the head is arrested or locked between the pubis and sacrum, the lever may be very readily applied, and, if much force be not required, it may assist advantageously in facilitating the descent of the head.

It should be introduced over the sacral side of the occiput, and the extremity of the blade be applied to the base of the occiput. The fingers of one hand being directed toward the os frontis, and over the shank of the instrument, considerable power may be exerted upon the occiput. The first effect of this traction will be very advantageous in perfecting the flexion of the head, should this be imperfect; while the second effect will be, in conjunction with the hand of the practitioner and the bearing-down efforts of the mother, to promote the descent of the head. It is manifest, however, that, owing to the imperfect hold the *vectis* has upon the occiput, when the head is in a state of flexion, much cannot be expected from its employment, and we must,

therefore, resort to another mode of delivery, far more efficient and valuable.

The third proposition is to employ the *forceps*. Much as has been written respecting the use of this most important agent in facilitating delivery in various cases of dystocia, we still think the full extent of its value has not been sufficiently understood. The improvement in the form of this instrument, and the more correct scientific principles which now guide the practitioner in its employment, are rapidly enlarging the sphere of its beneficial influence. In cases where there is a disproportion between the head of the fœtus and the passages of the pelvis, demanding more power than can be exerted by the mother, the forceps has been instrumental in saving a large number of children, which otherwise would have inevitably perished; and we cannot but hope that when practitioners divest themselves of the fears of applying the long forceps, when the head is high up in the pelvis, and when they become familiar with the scientific use of this instrument in such cases, many more children in proportion will be hereafter saved, and the tissues of the mother will suffer far less from contusion and mortification. In Great Britain the long forceps are very rarely employed. We find from the reports of Dr. Collins, of the Dublin Lying-in Hospital, that the long forceps had never been resorted to in sixteen thousand four hundred and fourteen cases of delivery, although the perforator was employed in eighty labors during his mastership of eleven years duration.

Other British practitioners have, however, not so completely ignored the long forceps, which have been employed more frequently, of late years, but apparently with no great success, so that the operation is still regarded with distrust, and as of very serious import to the mother and the child. On the continent of Europe, however, the practitioners have no hesitation, under suitable circumstances, of resorting to this instrument when the head is high up in the pelvis, and apparently with advantage, in saving the life of the infant, inasmuch as craniotomy cases, according to the best reports, are far less frequent on the Continent than in the British Isles. Dr. Churchill informs us that in Great Britain perforation was resorted to in one case out of every two hundred and ninety-one deliveries; while in France and Italy the proportion was one in every five hundred and sixty-three and three-quarters, and in Germany the proportion was only one out of every one thousand six hundred and seventy-five.

On the contrary, we learn from Cazeaux that forceps cases reported in Great Britain are in the proportion of one to three hundred and fifty-one, while in France the proportion is one in one hundred and sixty-two,

and Germany one in one hundred and fifty-three in cases.

Although such statistical reports, embracing, as they must, every variety of dystocia, do not give any positive information as to the results of labor under different varieties of treatment, nevertheless the conclusion seems probable that where the forceps have been most frequently employed, more children have been saved, or, at least, that craniotomy has been more frequently avoided.

In cases of contracted pelvis, when the short diameter is not less than three inches, it has been very generally recommended, since the invention of the forceps, to employ this instrument carefully and judiciously where delivery seems to be impracticable by the spontaneous efforts of the mother, or even when such efforts are assisted by the *vectis*.

It is manifest, that as the head is firmly impacted between the pubis and the sacrum, that the blades of the forceps cannot be applied over the sides of the head in all those cases where it is situated transversely, or somewhat oblique at the superior strait. If, however, which is exceedingly rare, the head should be, from any cause, fixed in the third or sixth position of Baudelocque, then the forceps could be readily applied in the direction of the occipito-mental diameter, and delivery be attempted. In the third position of the vertex—the occiput toward the pubis—the handles of the forceps, after their application, should be grasped with firmness enough to secure the head between the blades, and then, during the absence of a pain, the whole head should be elevated, so as to disengage it, if possible, from the superior strait, when it may be slightly rotated, in order to give it an oblique position. Then traction effort may be made during the existence of a pain, and the head be drawn down, according to the rules already detailed.

A similar manœuvre should be executed in cases of the sixth position of the vertex.

Where, however, the head has been impacted with the bi-parietal diameter, it has been very universally advised to apply the forceps over the occiput and over the forehead and face of the child, constituting, therefore, perhaps the only exception to the rule of applying the forceps over the sides of the head. (Plate XX., Fig. 107.) This has always been regarded as an unfortunate circumstance, for two or even three reasons. First, there is danger of injuring the features of the child by the pressure of the blade. This, however, is not so great as has been usually imagined, if the forceps be carefully applied; because as soon as any pressure is made by the forceps the flexion of the head is rapidly augmented, especially through the influ-

ence of the blade which operates upon the occiput. Hence the facial blade will be found to press almost entirely upon the os frontis, and the danger of injury to the features much diminished. The second objection is of more weight, viz., that the blades, operating from the occiput to the forehead, must diminish the occipito-frontal diameter, and, of course, compress the head and brain in the direction of its length. Hence, the head has a tendency to increase in the lateral direction, elongating the bi-parietal diameter, which it is so important in these cases should be diminished. In this point of view, the application of the forceps would be contraindicated as increasing the difficulty of the transit of the head. This objection is much dwelt upon by Dr. Simpson when alluding to this subject, who justly observes that the compression ought to be in a lateral and not in a longitudinal direction. The objection, therefore, is valid, so far as it is operative; but it should be remembered that the resistance of the sacrum and pubis will prevent any such elongation of the bi-parietal diameter, and that any enlargement of the head—thus compressed between the blades of the forceps, the occiput and os frontis, and the bones of the sacrum and pubis at its sides—must occur in some other direction, probably in that of the cervico-bregmatic diameter.

The force of this objection is also weakened when we remember the great power which can be exercised by the forceps, counteracting very generally all the compression which may exist in the direction of the bi-parietal diameter, and very effectually, therefore, assisting the bearing-down efforts of the mother in accomplishing delivery. Neither let it be forgotten that all such compression of the head after the forceps are applied is generally of short duration, for as soon as the parietal protuberances have passed the margin of the superior strait, the difficulty is over, the forceps should be immediately removed; or, if nature be still inadequate to the delivery, they may be re-applied in the usual manner over the sides of the cranium.

Notwithstanding the above objections to the application of the forceps to the head, impacted in the direction of its transverse diameter, there can be no doubt that deliveries can thus be effected in very many instances with safety to the child and to the tissues of the mother, provided the forceps be early applied before any injury has been sustained, either by the child or mother, from vain attempts at delivery.

Influenced, however, by the objections stated, the author has, for many years, entirely abandoned the practice of applying the blades of the forceps directly over the occiput and face of the child. In a case, for example, of the left occipito-iliac position of the vertex,

the left or male blade should be carried toward the left sacro-iliac symphysis, and the female blade toward the right acetabulum. The head of the child will then be embraced obliquely, the male blade extending over the left side of the occiput and the female blade over the right side of the os frontis and face. (Plate XX., Fig. 108.) The bones of the vault of the cranium, owing to their mobility, will (if the forceps be properly constructed) readily accommodate themselves to the blades, so that no injurious pressure will be made on the scalp.

The advantages of this mode of application are,

First. That the pressure being in an oblique direction, will have no tendency to increase the bi-parietal diameter of the head, but rather to diminish it.

Second. As moderate compression is made upon the head, combined with a traction effort, it will be found rotating somewhat to the oblique position corresponding to that of the forceps, so that the parietal protuberances will depart from their line of direction between the pubis and the sacrum and enter the fenestra of the forceps; and thus,

Third, an advantage will be gained, for the forceps will now have a direct influence in diminishing the bi-parietal diameter of the child's head, and thus facilitating its transit through the contracted opening, while any degree of suitable force which in the judgment of the practitioner can be deemed prudent may be exercised. The author has, in many instances, tried this mode of operating with very satisfactory results, using his own forceps. (Plate XV., Fig. 84.) No laceration has ever been inflicted on the head of the child; and no perceptible injury has been received by the mother's tissues—although in some instances the forceps were for a long time in use, the labor being tedious. The child has not unfrequently been saved where, in former labors, the children were still-born, or craniotomy had been employed. One case was very remarkable, where the female had been delivered by craniotomy in her first labor, and being exceedingly anxious to have a living child, now made the earnest request to be "cut open." The short diameter of the superior strait was not more than three and a quarter inches. A consultation having decided against the Cæsarean section, the author applied the forceps, as early as practicable, in the manner above directed. In the course of less than two hours the patient was delivered of a living child, having the occipito-mental diameter greatly augmented, and a deep indent under the mastoid process marked where great resistance had been made by the promontory of the sacrum on the left side of the head and neck of the child. On the day after the delivery the head had nearly resumed its natural configuration,

and proved of an unusual size, measuring not less than three and seven-eighths inches in its bi-parietal diameter.

That we may attain all the advantages which might be expected from this mode of delivery, the following rules should be observed:—

First. That the forceps be applied as early as practicable. The practitioner, having ascertained the contraction of the pelvis, should determine on his plan of treatment immediately. If the forceps are to be employed, time should be allowed for the full dilatation of the os uteri, for the rupture of the membranes, and for the subsequent contractions of the uterus sufficiently strong to fix the head at the superior strait. Under these circumstances, the instrument can be more readily applied than when the head is firmly impacted between the bones of the pubis and sacrum; and, moreover, their application may be directed more exactly upon the sides of the cranium; and the head, not being fixed, will turn more readily within the grasp of the forceps, so that the parietal protuberances will pass within the fenestræ. If this be the case, any compression made by the forceps will diminish the bi-parietal diameter of the head, thus not only facilitating its passage, but, also, diminishing, so far as this compression is operative, the pressure upon the mother's tissues—the requisite pressure being thus, at least, partially made by the instrument. Of course, it will be very advantageous to have a pair of long forceps, where the fenestræ are sufficiently wide to receive the prominent portions of the cranium; so that the instrument, when in contact with the head of the child, shall not occupy space. The

Second rule to be observed is, to operate very slowly, and in the direction of the axis of the pelvis. The object of the accoucheur is to imitate nature as far as practicable. In spontaneous deliveries, in contracted pelves, labor is necessarily tedious; the compression to which the head is subjected is always gradual, allowing time for the yielding of the commissures, the overlapping of the bones, the elongation of the head, and the consequent alteration of the form of the contents of the cranium. Hence, the forceps being applied, very slight compression and traction should be made at first; the patient should be encouraged to make her bearing-down efforts, and the practitioner should afford moderate assistance during the existence of a pain. As soon as this intermits, pressure should be removed from the handles, so as to free the head as much as possible from compression. Thus, the head will gradually accommodate itself to the opening, and it is not until the parietal protuberances are upon a level with the linea ilio-pectinea, or circumference of the strait, that much effort should be made by the for-

ceps. This, of course, is the exact period of difficulty and danger to the child and the parent. At this moment, therefore, during the existence of a pain, the practitioner must employ the requisite degree of compression, traction, and leverage, which he may deem it prudent to exercise. It will be very seldom that we cannot thus effect the delivery of the child through the contracted brim, and cause its descent into the cavity of the pelvis.

Should there be any deformity at the inferior outlet, the same attentions and prudence should be exercised; but, if the only contraction be at the superior strait, the grasp of the forceps is to be diminished as much as possible, while delivery is hastened.

By thus facilitating the natural operations, imitating, as far as practicable, nature's mode of delivery, and by not making any sudden compression of the head, by which the tissues of the scalp, cranium, the substance or the membranes of the brain might be lacerated or its functions paralyzed, we must believe that, in most instances, indeed in all, that the head, unless unusually ossified or deformed, can be brought through a contracted pelvis whose conjugate diameter is at least three inches; and that, in many instances, a living child will be presented as a reward to the mother for her sufferings, and to the practitioner, as a recompense for his caution and scientific exertion.

Our experience is that, in such deliveries, neither the tissues of the child's head nor those of the mother have ever been seriously injured. Very trifling inflammation has resulted, and, in no instance, has the bladder or rectum sustained any injury. We believe, as already stated, that such injuries to the mother result from the want, rather than from the use, of instruments; from unnecessary delay, and, of course, the long-continued, unremitting pressure of the child's head on the contracted apertures of the pelvis.

A further encouragement for this mode of delivery is, that the cord and placenta are comparatively free from pressure. The uterus being still large from the presence of the body of the child, the placental functions and the organic life of the child will continue, with little comparative injury, during very protracted cases of delivery; affording, also, another reason why the practitioner should not be in haste to finish the process after resorting to the forceps.

Most of the objections which have been urged against the use of the long forceps in contracted pelves have originated from the improper form of the instrument, and, perhaps, mainly, from the unscientific mode of their application, and from the mistaken idea that, when the forceps are employed, delivery should be accomplished in the shortest possible time. Powerful

compression and traction have been instantaneously made, and a rapid lever-like motion given to the handles, by the anxious but unscientific practitioner, who, intent upon accomplishing the grand object of delivery, forgets the laws of nature, and the vitality of the tissues of the mother and of her infant. It should never be forgotten that the forceps should be regarded as a mere addition or substitute for the natural powers by which the child is expelled, and that they should be used, therefore, so as to imitate nature's mode of delivery.

The fourth mode of assisting deliveries through a contracted pelvis is by the operation of *podalic version*. Prior to the introduction of the forceps, version was very frequently resorted to, under the hope of preserving the life of the child in cases of deformed pelvis, where the practitioner had no other resource than the terrible operation of embryotomy. Since the happy invention of the above valuable instrument, turning has been less employed, and the lives of many children have been saved, which would have otherwise perished from craniotomy. A few high authorities still retained a partiality for version in preference to the forceps, among whom may be mentioned Madame Lachapelle. Nevertheless, it has been considered a settled practice, founded on theory and experience, that version should never be advised, either for the sake of the mother or child, in contracted pelvis; and it was always thought very unfortunate, if, in cases of such deformities, the child should present the pelvic extremity of the foetal ellipse at the commencement of labor. Dr. Radford, of Manchester, and more especially Professor Simpson, of Edinburgh, have made a strong effort to overthrow this practical principle. Dr. Simpson has published a very elaborate article in which he ingeniously and with great ability endeavors to prove that version is to be preferred to the forceps or craniotomy, in cases where there is at least three inches in the conjugate diameter of the pelvis. He has thrown so much light upon the subject by his reference to statistics, that many individuals, in this country as well as in Europe, have resorted to version in preference to the forceps or craniotomy. It will be advantageous to present some of the facts and opinions of Dr. Simpson on this interesting subject, in order to estimate aright the respective advantages of these different modes of delivery in contracted pelvis. If the question were simply, whether version by the feet or craniotomy is the preferable operation where there is at least three inches in the short diameter of the superior strait, there can be no dispute. There is probably no educated practitioner who would hesitate to adopt this measure, if the forceps were not at his command.

The proper question to be examined is, whether, under the above circumstances, version be superior to the operation by the forceps.

Dr. Simpson details numerous and interesting cases from his own practice, and from that of others, where children have been delivered footling through a contracted pelvis with safety, although, in some instances, the bones of the cranium have yielded and been indented to the extent of six or even twelve lines. Occasionally, such depression of the bone has continued for days and weeks after delivery, and yet has disappeared without any permanent injury to the child.

Such fortunate results, although exceedingly rare, as will be hereafter shown, are nevertheless encouraging, and fully justify the conclusion that craniotomy should never be employed where there is the least hope that the child can be saved by version.

We must, however, dissent from the conclusion that version, in a contracted pelvis, is safer for the child or the parent, than the delivery by the forceps.

Dr. Simpson asserts that the child's head is more compressible if it presents the base at the commencement of labor, in these deformed pelvises, than if the vertex descended first. He affirms that the head should be regarded as a cone, the base of which is the top of the head, and the truncated apex is below. Hence, he infers that when the child is delivered footling, the bi-mastoid diameter becomes first engaged, and that the compression of the head will be gradually made, owing to the inclination of its sides, until it reaches the parietal protuberances, giving all the advantages of the wedge. If, on the contrary, the top of the head descends first, a broad surface is immediately presented at the superior strait, which cannot directly enter, and hence is pressed firmly against the "sides of the aperture," increasing instead of decreasing the bi-parietal diameter.

This representation is, in several respects, incorrect. No evidence is adduced to prove that the bi-parietal diameter, under these circumstances, would be enlarged by the flattening of the head. One parietal protuberance might be arrested on the bones of the pubis, but the other would glide on the convexities of the lumbar vertebræ and promontory of the sacrum, giving more or less an oblique position to the head of the child, which would be compressed between the muscles of the abdomen anteriorly, and the tissues of the pelvis posteriorly, and thus there would be a tendency to diminish the bi-parietal diameter. This tendency will be greatly facilitated by the overlapping of the parietal bones at the sagittal suture. If, therefore, the presentation were strictly that of the "top of the head," (Plate IV., Fig. 28,) there would be no flattening produced, but rather

a greater degree of convexity at the apex of the cranium.

This view is in such perfect unison with the descriptions given by practitioners of the effect of the bearing-down efforts upon the head of the child, in cases of contracted pelves, that we cannot but believe it to be correct; and therefore that no flattening of the head occurs in these instances.

It has, however, been shown, when speaking of the mechanism of labor, that if there be much resistance at the os uteri, flexion of the head is continually increased, so that eventually the posterior extremity of the occipito-mental diameter comes to the centre of the pelvis, and we have a presentation of the occiput. (Plate IV., Fig. 25.) Such flexion will be still more perfect, if possible, in cases of contraction of the superior strait. Hence, instead of the flat surface of the top of the head being first engaged, we shall have the occipital protuberance, followed by the bis-occipital diameter, measuring two and a quarter inches, and eventually by the bi-parietal, measuring three and a half inches; thus giving all the advantages of the "wedge" which Dr. S. considers so important.

In this case, also, the compressing force will be made on the sides of the head as advantageously as if the base of the cranium presented.

Experience confirms this, as in all cases of protracted delivery the head is lengthened in the direction of its occipito-mental diameter, and diminished in the direction of its transverse diameter.

Comparing, therefore, the presentation of the base of the cranium with that of the occiput, there is no mechanical advantage in favor of the former. On the contrary, as the superior part of the cranium is more compressible than the inferior, the bi-parietal diameter will be more readily diminished in presentations of the occiput than in those of the base of the cranium.

We object also to the declaration that the base of the cone of the head should be located at its superior part; the real base is at the occipital extremity, and of course its apex is at the chin, and not at the base of the cranium. If, therefore, pelvic deliveries be properly conducted, it is the chin which enters first into the cavity of the pelvis, (Plate XI., Fig. 62,) followed by the bi-malar, bi-temporal, and eventually by the bi-parietal diameters; the bi-mastoid being very slightly concerned. If traction, however, be improperly made through the medium of the neck alone, then the base of the cranium—as represented by the bi-mastoid diameter—will be brought down first, (Plate XXX., Fig. 145;) but every accoucheur knows that this would increase, not diminish, the difficulties of delivery.

The argument, therefore, of Dr. Simpson would have

been strengthened if he had represented the chin and not the base of the cranium as the apex of the cone. All then would be obliged to acknowledge that, in a mechanical point of view, it would be better to have the mental instead of the great occipital extremity of the head presenting in difficult labors.

There are, however, many and very serious objections to this mode of delivery, which will fully counteract any slight mechanical advantage derived from the presentation of the chin.

In artificial pelvic deliveries the force applied must be through the medium of the spine; hence, as is well known, there is great difficulty in maintaining the flexed condition of the head. This difficulty will be particularly great in contracted pelves. Powerful traction made, therefore, on the body of the child will cause the posterior part of the head to descend more rapidly than the anterior. Hence, the chin departs from the breast, and the occipito-frontal diameter will become involved instead of the cervico-bregmatic, greatly aggravating the difficulty of delivery, and demanding, therefore, that greater force be applied by the hands of the accoucheur and his assistants.

Moreover, this traction effort is always dangerous, and often fatal, in consequence of lesion thus inflicted on the tissues of the neck, and especially on the spinal marrow. Dr. Simpson has, it is true, detailed most wonderful escapes, where the traction had been so great as to cause indentures and deep depressions of the cranium; but these certainly are exceptionable cases, and cannot be regarded as forming the foundation for any practical rule. Children very often perish under these circumstances, especially when the neck has, through carelessness or ignorance, been twisted; or where the force has been too suddenly or too severely applied. There are but few practitioners who have not seen or at least heard of cases where the neck has been completely torn through and the detruncated head been left behind in the pelvis.

The necessity that the delivery should be *rapid* in these pelvic cases, constitutes another serious objection to version; if there be any delay, the child perishes from suspension of the placental functions. Hence, the practitioner becomes anxious to hasten the process, and must make sudden and powerful traction through the medium of the neck. Hence, also, no time will be allowed for the gradual moulding of the head; but its tissues will be suddenly compressed, and there will be great danger of rupture of the blood-vessels of the brain, its membranes, etc., with the usual fatal consequences.

The fact, that delivery can occasionally be more rapidly produced by version than by the forceps, can-

not, therefore, be adduced in favor of version; no such hasty operation can be safely performed, where there is a disproportion between the head of the infant and the passages of the pelvis. Dr. Simpson has detailed some very extraordinary cases in which children have been saved, where great delays existed, in pelvic deliveries; but most accoucheurs will join with the experienced and judicious Dr. Denman in the declaration that they "have not been so fortunate as to meet with any such instances—a short space of time frustrating hopes." The truth is, that pressure upon the umbilical cord causes death almost as speedily in the unborn infant as pressure upon the trachea after birth. It would be easy to adduce proofs of the death of infants in the course of a few minutes after an interruption of the circulation in the cord. Dr. S. attempts to weaken the force of this objection by stating that the umbilical cord can be pushed to the side of the face of the child, or in these cases of "kidney-shaped deformity," as he terms it, where the promontory of the sacrum projects toward the pubis, the cord may be protected in the notch on either side of the vertebræ. But every practitioner knows not only the difficulty of altering the location of the cord, but also that much valuable time will thus be lost. Moreover, let it be remembered that the pressure on the cord is effected not so much by the pressure of the head against the margins of the pelvis as against the rigid cervix of the uterus, rendered still more firm by the powerful contractions of this organ, so that it is really impossible by any arrangement to free the cord from a pressure so rapidly destructive to life.

This great danger is enhanced by another fact too generally overlooked in treating of the operation of podalic delivery, viz., the usual suspension of the placental functions from the diminished size of the uterus. In vertex presentations the uterus remains large, the body and extremities of the child being still within its cavity, and therefore there is no separation of the placenta from the internal surface of the uterus. Where, however, the body has been delivered and the uterus has been acting vigorously to force the head through the superior strait, its size is greatly diminished, and in many instances the head may be entirely out of the uterus, or, at least, a very small portion remains within the cervix. Thus, the placenta is either completely detached from the internal surface of the uterus, or the connection is so impaired that its functions cease. Hence it follows that whatever dexterity might be exercised in freeing the cord from pressure, yet this would be unavailing, inasmuch as the placental influence is nearly or altogether suspended.

For these reasons pelvic deliveries are very dan-

gerous to the infant, and must be speedily accomplished, or the child perishes. Of course, it is possible in some such cases as presented by Dr. S., that delivery may be effected rapidly; but in contracted pelvis this is not to be anticipated—delay will almost universally occur, and, if it exist even for a short time, is fatal to the child; while in vertex deliveries hours may elapse and yet the child may survive.

Dr. S., however, contends that the child will be safer, because version can be early resorted to—as soon as the os uteri is dilated, and even before the membranes are ruptured. We, however, cannot regard this argument as of any force whatever; for we have already shown, in speaking of forceps delivery, that these instruments, in cases of contracted pelvis, may, and ought to be applied soon after the membranes are ruptured, and before either the child or the mother's tissues are injured by unavailing efforts. This early application of the forceps, we know, has not been considered advisable by British accoucheurs, who wait for a long time before resorting to them, to the manifest injury of both mother and child. As Dr. Simpson observes, the forceps are never employed at the superior strait, until the head be "locked," and the tissues of the child and mother are both endangered by the violent and ineffectual efforts at spontaneous delivery. No wonder, then, that the child perishes, that the tissues of the mother are so frequently destroyed, and that the long forceps are regarded with dread, as the cause of these dire calamities. There is no necessity, however, for this delay, and, therefore, no argument can be drawn, on this account, in favor of version.

To the mother also the operation of version is painful and dangerous, even when there is no serious complication. When the uterus has firmly contracted, and the bearing-down efforts are great, the operation is one of the most severe in obstetric surgery; indeed, it is often impracticable, even with all the aid that can be rendered by the process of anæsthesia. In contracted pelvis, therefore, all these dangers must be exceedingly aggravated. If the proper moment can be seized, version is occasionally feasible, and may sometimes prove successful; but if the uterus be contracted, it will be found generally impossible to effect the introduction of the arm, or, at least, the mutation of the child. Even should this be effected, without the contusion or laceration of the uterus, the subsequent dangers to the mother, from the child being rapidly and forcibly drawn through the contracted apertures of the pelvis, are of the most serious import. Contusion, laceration, inflammation, and mortification of the os uteri, vagina, bladder, or rectum, have not unfrequently resulted.

Contrasted with these necessary dangers to the mother, not unfrequently involving the integrity of her tissues, and even her life, the operation with the forceps will be found far preferable to podalic version. A well-constructed instrument can, by an experienced hand, be introduced, with little or no pain or irritation; it occupies no space, as the projecting parts of the head may be accommodated within the fenestræ of the forceps; compression may be very slowly and gradually made upon the sides of the head, thus lessening the transverse diameter, and, at the same time, *diminishing*, instead of increasing the pressure upon the mother's tissues. Delivery can thus be accomplished in perfect accordance with nature's laws. The vertex descends first; the head is lengthened in the direction of its occipito-mental, and is contracted in the direction of its bi-parietal diameter. The uterine forces are assisted by a power, which can be carefully regulated by the mind and hand of the practitioner, who should act slowly and cautiously, making traction in the axis of the obstetric canal at intervals simultaneous with the uterine efforts.

Let it be remembered that there is no necessity that the operation should be rapidly completed, inasmuch as the functions of the cord and placenta will not be disturbed, as in cases of podalic version. If the author be allowed to judge from his own experience, no injury will be sustained by the tissues of the mother, and there will be very little, if any additional suffering to that which exists in ordinary labors. On the contrary, in version by the feet the comparatively large hand, and even arm of the practitioner, occupying a great deal of space, must be introduced into the uterus, even to its fundus, exciting violent pain and contractions, and altering the presentation from that which is natural to that which is very generally regarded as preternatural. Then the feet being drawn down, additional manual assistance is demanded to extricate and bring down the arms of the child; to produce flexion of the head; and to make powerful traction, so as to effect the delivery of the head; while the compression necessary for the diminution of its diameter is effected entirely by the bones of the pelvis, covered by its delicate, sensitive, vital tissues. For these reasons we must believe that the "formidable steel instruments," as they are termed by Dr. Simpson, will accomplish delivery where the pelvis is moderately contracted, with more safety to the child and its parent, than can be secured by podalic version.

It may be further added that the operation by the forceps may be resorted to at any period of the second stage of labor, however long may have been its duration; while the operation of version must necessarily be

restricted to the earlier periods, as no prudent practitioner would force his hand into the uterus, when this organ is rigidly and unremittently contracted upon the body of the child; neither would version be practicable if the presenting part had escaped beyond the verge of the os uteri.

The above observations, in reference to the dangers to mother and child in version by the feet, or by the forceps, we think, are confirmed by reference to statistical reports, which, although necessarily indefinite, as embracing every variety of complicated labor, and as presented by practitioners influenced by diverse theoretical principles, and acting under different circumstances, nevertheless will afford some approximation to truth. Thus we find that vertex deliveries are far more frequent than pelvic, amounting to ninety-seven per cent., according to the reports of Velpeau, collected from many authors; and are hence termed natural deliveries, as being not only the mode usually adopted by nature, but as being far more safe for the infant; for we find that the average number of deaths in vertex presentations is three per cent., while the number of deaths in pelvic deliveries is nearly twenty-eight per cent. This, of course, includes all the varieties of pelvic deliveries, natural or artificial, in the various complications of labor.

We find also that in the reported cases of artificial pelvic deliveries, the infant perishes in the proportion of one in every three cases, or thirty-three per cent., and hence the inference may be fairly made, that if the pelvis were contracted, the number of deaths would be greatly augmented, in proportion to the degree of contraction, and the size of the child's head. M. Capuron says that in "difficult cases" two-thirds, or even three-fourths of the children perish, (sixty-six to seventy-five per cent.,) and Cazeaux declares that his experience is not very different. As regards the fatality to the mother in all cases of version, it is about one in fourteen cases, or say seven per cent., according to the elaborate tables of Dr. Churchill.

As to the comparative advantage of the forceps the reports of different accoucheurs are so indefinite, and so incomplete, that no very positive declaration can be made; still its superiority over the operation of version by the feet, in cases of tedious and difficult labor, would seem to be quite apparent. The following summary of forceps cases we extract from Churchill's Midwifery. He tells us that in British practice the proportion of deaths of the child in forceps cases was nearly 20.5 per cent., say one in five, while in French and German practice it was a little more than seventeen per cent., say one in six. Deaths of the mother in British practice were 4.68 per cent.,

or one in twenty-one and a third; but in France and Germany it appears to be 2.88 per cent., or nearly one in thirty-five. The average of the whole number of deaths of children is about 17.41 per cent., or one in five and three-quarters; and of the mothers a little more than three per cent., or about one in thirty-two.

The following short table presents a summary of the results of artificial delivery as effected by podalic version, or by the forceps, as drawn from the data now detailed:

Mode.	Children lost.	Mothers lost.
Version	33.	7.
Forceps	17 $\frac{4}{16}$	3. +

As already intimated, we consider all such statistical results as affording but an approximation to the truth; nevertheless, when it is observed that the ratio of mortality under these two modes of artificial delivery is in the proportion of two to one, both as regards the mother and the child, in favor of the forceps, the inference seems unavoidable, that in all cases where there is a disproportion between the size of the head and the canal of the pelvis, that both mother and child will be safer, when resort is had to the forceps, than to version by the feet. We must believe also, that when the principles which should guide us in the use of the forceps are better understood, and when practitioners are more universally furnished with good instruments, and are prepared to employ them at an early period of difficult labor, the results in their favor will be still more decided.

We are happy to find that Dr. Churchill has evidently been greatly influenced, by the result of his statistical investigations, in favor of the more frequent and earlier resort to the forceps in cases of dystocia. He very candidly observes, "that it would be unjust (to Continental accoucheurs) to compare the frequency of forceps cases among the Germans and British, without recollecting the minor degree of mortality amongst the children in the practice of the former, and the very much smaller number of crotchet cases. It would seem, that although the Germans use the forceps much more frequently than we do, they often thereby avoid a much more fatal operation."

We have no doubt that the more frequent employment of this valuable instrument will not only prevent recourse to the perforator, but will prove very successful in preserving the life of the child in cases where it must have perished from delay. In this city, at least, where practitioners have no hesitation in applying the

forceps early in suitable cases of tedious labor, and very universally with favorable results, no dread of doing mischief to the mother is apprehended, even if the case should prove unfortunate for the infant.

The fifth mode of effecting delivery in a contracted pelvis is by *embryotomy*. The nature of this operation, the circumstances under which it is demanded, and the mode by which it may be performed with the greatest possible safety to the mother, have already been detailed under the general head of obstetric operations. Although occasionally required, when the sacro-pubic diameter measures three inches or more, yet it is chiefly demanded when this diameter is less than three inches.

The sixth mode of delivery in deformed pelvis is *gastrohysterotomy*; which, however dangerous it may be, will usually excite the hope that both mother and child will be preserved. This hope, under the combined influence of science and experience, is becoming brighter; and although it is impossible that it can ever be performed without imminent danger to the mother, yet its domain may be extended, so that, in many instances, it may be preferred to embryotomy, affording an equal and sometimes a better chance for the mother, while the life of the child—which would be sacrificed by *embryulcia*—will very often be preserved. In the present state of our knowledge its employment is generally to be restricted to cases where there is less than two inches in the shortest diameter of the pelvis.

MAL-POSITIONS OF THE UTERUS.

As formerly explained, these mal-positions may occur after or before the fourth month of pregnancy. In the former case, they are termed obliquities of the uterus; in the latter, prolapsus or version of the uterus.

This distinction between obliquities and versions of the organ we conceive to be of great importance; the former produce many inconveniences during gestation after quickening, sometimes causing mal-presentations of the foetus, and, in a few cases, complicated delivery at term; while the displacements within the pelvis are productive of much more serious symptoms within the first four months of gestation, and often prove to be dangerous to the child, and, occasionally, even to the parent. We find, however, that many authors confound version with obliquity. Even M. Cazeaux details cases of retroversion of the uterus, under the head of Posterior Obliquity of the Organ.

Obliquities of the Uterus.—The three varieties of obliquity and their causes have been already specified, (vide page 51.) The *diagnosis* during the latter periods of pregnancy is not usually difficult. By an external

examination, in cases of lateral obliquity, the fundus of the uterus can be felt more to one side than to the other; the lumbar region, on the right or left, where the uterus presses is more tense than the opposite occupied by the intestines; while, in anterior obliquity, the upper part of the abdomen will be less distended, the lower portion very much enlarged, projecting downward, so that, in a sitting posture, it is almost resting upon the lap of the woman. By an internal examination, the orifice of the uterus will be found to the right or the left of the pelvis, if the obliquity be lateral, or toward the promontory of the sacrum, or even the lumbar vertebræ, if the obliquity be anterior.

During the first stage of labor, the evidences of obliquity are precisely similar, excepting that the os uteri will be found partially or completely dilated toward the sides or posterior part of the pelvis, as the case may be.

To the inexperienced, some difficulty may exist in finding the os uteri, and doubts even may be entertained whether this orifice has not been completely closed, as no part of it can be reached by the finger. It is easy, therefore, to complete the diagnosis by carrying the whole hand, if necessary, into the vagina, when the orifice of the uterus will be detected in front of the lumbar vertebræ, or toward one of the iliac fossa.

In the second stage of labor, until the os uteri is fully dilated, and while the membranes remain entire, the same relative position of the uterus may exist; but, as soon as the membranes are ruptured and the liquor amnii discharged, there is a natural tendency to restoration. In *lateral obliquities*, the alteration of position generally depends upon the large size of the uterus, the unyielding character of the abdominal parietes pressing the uterus firmly against the convexity of the lumbar vertebræ. Hence, as soon as the waters are discharged and the tonic contractions of the uterus have occurred, the size of the organ is so much diminished that it can be readily accommodated in front of the spinal column. The natural tendency to rectification is assisted, not merely by attachments of the vagina, fascia, etc., at the cervix, but, also, by the action of the lateral, and, especially, by the round ligaments, which, upon one side, have been disproportionately elongated. It is still more powerfully facilitated by the bearing-down efforts of the abdominal muscles, which, acting equably upon both sides of the uterus, must direct it more or less exactly to the median line. In practice, therefore, so far as the mechanism of descent is concerned, these obliquities of the uterus seldom interfere with the process of labor; the membranes being ruptured, and the expulsive efforts being established,

the child and the uterus are brought into the direction of the axis of the superior strait. This is, however, not universally the case; but, if the axis of the uterus remains oblique, parturition will be delayed, as the presenting part of the child, at the os uteri, will be directed, not toward the centre, but toward the margin, of the superior strait. This must be a very rare case, especially as such practitioners as Drs. Denman, William Hunter, Churchill, and many others, doubt whether there is any delay in the process of labor caused by obliquities.

In *anterior obliquity* of the uterus, there is, also, the same natural tendency, after the rupture of the membranes, to rectification. But this tendency is not so strong as in the former cases: for, where there is great relaxation of the abdominal muscles, their contraction is less efficient in drawing up the fundus of the uterus; for the diaphragm and the weight of the viscera have a tendency to depress the fundus anteriorly. Nevertheless, the uterus, being much reduced in size, the bearing-down efforts of the mother are so much resisted toward the posterior part of the uterus, by the recti and other abdominal muscles and tissues, that these efforts are there directed through the medium of the intestines—of course, determining the cervix uteri and the presenting part of the child from the promontory of the sacrum downward into the pelvis, thus facilitating the ascent of the fundus toward the umbilicus, and the consequent correspondence of the axis of the uterus to that of the superior strait. Occasionally, however, it may be, that this descent of the os uteri and the disappearance of the obliquity may not occur, or, at least, may prove very tedious, the labor being delayed by the impulsion of the fœtus obliquely against the spine or the promontory of the sacrum.

The bad consequences arising from obliquity of the uterus during the second stage of labor are, therefore, comparatively rarely to be observed, so far as the descent of the child is concerned. Other bad consequences of such displacements, such as mal-presentations and positions of the fœtus, have already been noticed.

Some authors, such as Deventer, Levret, Dugés, Lachapelle, Velpeau, and Cazeaux, believe, in opposition to the general opinion of the profession, that *posterior obliquity* may occasionally exist. On account, however, of the projection of the lumbar vertebræ, a posterior obliquity can hardly be possible, and the cases cited as examples, by these gentlemen, are not sufficient to substantiate their opinion. The cases from Drs. Merriman and Billi are evidently those of retroversion; for it is carefully stated, that the os

uteri was tilted up above the pubis, and the body of the uterus occupied the cavity of the pelvis. Velpeau details some interesting cases and quotes others, where the head of the child is found, before and during labor, over the bodies or rami of the pubes. In one very interesting and extraordinary case, where the anterior parietes of the uterus and abdomen were exceedingly relaxed and thinned, the child's head was in front of the pubis, and its fontanels and sutures could be detected through the walls of the abdomen. The os uteri was felt at the brim of the pelvis over the pubis, and, even after seven hours of labor, was very slightly dilated. By placing the patient upon her back, and making firm pressure externally, the head was elevated above the pubis, and pushed backward. The os uteri now dilated, and the mother was delivered of a living child, and did well. This, we think, was not a case strictly of posterior obliquity, but one of great emaciation and weakness of the anterior walls of the abdomen and uterus.

In these "*sur-pubal*" cases, which are very uncommon, it does not appear that the fundus of the uterus was thrown backward, but that the head of the child received this anterior position from a great right or left obliquity of the organ; from an unusual inclination of the superior strait of the pelvis, so that the bones of the pubis were much lower than usual; from great relaxation of the muscles of the abdomen; or from some flexion or other deformity of the cervix uteri.

Flexions of the uterus, which are familiar to every one as existing in the unimpregnated uterus, no doubt also exist during pregnancy. It is very common, therefore, in the early stages, to find not only a prolapsus of the uterus, but also flexion of the cervix, and when the pelvis is unusually large, such flexion is sometimes observable, even at the fifth or sixth month of gestation. Moreover, in cases of anterior obliquity of the uterus, the os uteri sometimes presents at the brim of the pelvis, while the fundus is much depressed anteriorly, showing that there must be a flexion toward the neck of the uterus, constituting a case of anterior obliquity complicated with flexion.

It is more common, however, to meet with cases where the cervix bends in the opposite direction, the axis of the body of the uterus being coincident with that of the axis of the brim, while the os uteri is opposed to the hollow of the sacrum. These have been termed "*deviated*" positions of the os uteri; in a minor degree they are not unfrequently met with during the first stage of labor. Cazeaux supposes that, in some instances, it is owing to the more rapid dilatation of the posterior than of the anterior lip of the uterus.

During the second stage of labor, these obliquities of the os uteri, and these flexions of the cervix disappear spontaneously under the influence of the contractions of the uterus and abdominal muscles. It is reported, however, that where the voluntary efforts are powerful, the child's head is forced against the anterior portion of the cervix so severely that contusion, and even laceration of the tissues have ensued. This certainly must be a very rare accident.

The *diagnosis* of displacement of the os uteri and of the anterior or posterior flexion of the cervix can readily be established by noticing, not merely the position of the os by the finger in the vagina, but also the position of the fundus uteri by an external examination.

The *treatment of obliquities of the uterus*, during pregnancy and in the first stage of labor is seldom required. In *anterior* obliquity, however, to promote the comfort of the woman during gestation, and to prevent inconveniences during labor, the patient should spend much time in the recumbent position, on her back; and when in the sitting or erect posture, the lower part of the abdomen, and, of course, the uterus, should be supported by proper bandages, extending around the back, so as to perform the duty of the relaxed abdominal muscles; care being taken that the pressure be moderate, and no pain or irritation be excited. Of course, in all *lateral* obliquities, such abdominal supporters would be productive of mischief.

The degree and the symptoms of obliquity will be diminished in all cases by preventing any unusual distension of the stomach, bowels, etc. Hence, much attention should be paid to the digestive processes, so that, by diet, medicines, etc., all flatulency and costiveness may be very carefully obviated. In cases of pregnancy, complicated with ascites or other dropsical effusions, the question of paracentesis abdominis may be agitated, and the operation sometimes be demanded, not simply or chiefly on account of the obliquity of the uterus, but to prevent premature labor, or to relieve urgent symptoms, involving the comfort, or even the life of the mother, in consequence of the great distension.

During the *second* stage of labor, the treatment of any existing obliquity demands immediate attention. If the practitioner be called before the membranes are ruptured, the patient should be placed in bed in a proper position: in the right lateral obliquity, for example, upon her left side; but if it be a left lateral obliquity, on her right side; while in the anterior obliquity, she should be placed upon her back, with her hips and shoulders elevated, the lower extremities flexed, and, by means of the hands of the practitioner or by a bandage, the fundus may be elevated. As soon

as the os uteri is sufficiently dilated, the membranes should be ruptured, and care be taken to insure the complete evacuation of the waters by occasionally elevating the presenting part of the child, so as to allow room for their escape. Very universally, for reasons already mentioned, nothing more will be required; the os uteri and the presenting part gradually passing to the centre of the pelvis. Should this, however, not be the case, some delay will necessarily be experienced, as the child will be impelled laterally toward the sides or anterior portion of the pelvis, and, in some instances, the head has been found even above the linea ilio-pectinea, resting over the horizontal ramus of the pubis, or in the iliac fossa. The natural tendency to rectification in such cases of lateral obliquity may be facilitated, not merely by the position of the patient, but by "external manipulation," one hand of the practitioner directing the fundus of the uterus toward the median line, while, by the opposite hand, the cervix uteri is pressed toward the brim of the pelvis; care being taken not to excite pain or irritation.

It has been recommended also to pass a finger into the os uteri, and, by a traction effort on its margin, give a proper direction to the orifice of the uterus. This may sometimes be advisable, but must be performed with great discretion, so as not to induce local irritation of the cervix. Velpeau and Ramsbotham object to all such traction, as being unnecessary and often injurious.

In *anterior* obliquity similar attentions are to be paid, after the dilatation of the orifice of the uterus, by elevating the fundus of the uterus, rupturing the membranes, and promoting the descent of the cervix. In bad cases, it may frequently be necessary to pass the whole hand into the vagina, so that the finger can rupture the bag of waters and can act upon the edges of the os uteri.

Of course, if there should be any mal-presentation arising from these obliquities, they should receive appropriate attention on the discharge of the liquor amnii.

In those extraordinary cases where the neck of the uterus is flexed, or where, from any accident, the head of the child is over, or even in front of the pubis, as in Velpeau's case, the same general principles should be our guide. The axis of the uterus should be made to correspond to that of the superior strait, and the plane of the os uteri to that of the brim. Nature will almost universally safely accomplish the delivery if these indications be fulfilled. We can hardly believe that either podalic version or vaginal hysterotomy should ever be demanded in the treatment of these complications.

Hernia of the Uterus.—Labor is said to have been complicated with hernia of the uterus, that is, the uterus has, from some unusual combination of causes, been protruded through openings in the walls of the abdomen, after conception has taken place.

Hernia should not be confounded with "Eventration;" that is, where there is a great relaxation and thinning, in whole or in part, of the walls of the abdomen, so that irregular projections of the uterus and child can be felt externally. Velpeau's case, where the head of the infant had descended in front of the pubis, as low as the vulva, (vide page 410,) was, therefore, an example of eventration, not of hernia.

Uterine hernia has occurred at the umbilicus, at the groin, and also through preternatural openings in the abdomen. Dr. E. Kennedy mentions a case where the uterus, in a third pregnancy, escaped through the umbilical orifice, and was developed outside, so that at term, the organ extended even to the knees. In this woman a common umbilical hernia had been formed during labor with her second child, and continued until her third pregnancy.

Mr. Murray, of London, also details a case of protrusion of two-thirds of the uterus through the umbilicus, including the fœtus. The whole mass, toward the close of pregnancy, was reduced by *taxis*. A proper bandage to the abdomen prevented the return of the hernia, and the child was born safely at term.

Cazeaux quotes from a Spanish journal a case where hernia of the uterus occurred in the seventh pregnancy, in a woman who had suffered from an enterocœle for many years. The tumor, which projected from the right groin over the pubis to the left thigh, measured some twenty-six inches in circumference. The hernia could not be reduced, and hysterotomy was therefore performed, both mother and child being saved. The uterus, however, could not be returned into the abdomen after delivery. Other cases are also upon record.

Madame Boivin details a case where a large abscess, having existed at the lower part of the abdomen, the uterus protruded through the opening externally.

The predisposing cause, therefore, of hernia of the uterus, is the prior existence of some preternatural opening through the muscular walls of the abdomen, or the unusual dilatation of some one of the natural apertures. The exciting cause, of course, is the pressure of the abdominal muscles after the fourth month of utero-gestation.

It is said that, in some instances, the uterus in the unimpregnated condition has constituted part of the contents of a hernial sac; the organ, says Velpeau, being sometimes very much elongated, while in other

instances, it is the vagina alone which has been extended.

The *diagnosis* can probably be readily established by an external and internal examination.

Externally, the want of a general distension of the abdomen, the existence of a large tumor through which can be felt the form of the uterus and that of the child, and also the motions of the infant, would render the case very clear. The diagnosis would be confirmed by auscultation; the pulsations of the heart and the placental murmur would be unusually distinct.

Internally, no portion of the uterus would be recognized in the cavity of the pelvis, or sometimes in the cavity of the abdomen, even if the hand could be passed into the vagina.

The disappearance of the menses, the enlargement of the mammæ and areolæ, and the gradual, regular, and rapid development of the tumor, etc., would leave little doubt of the nature of this extraordinary accident.

The *prognosis* must vary, much depending upon the peculiar circumstances of the case. From the instances upon record, it is evident that hope may be entertained for the preservation of both mother and child without or with artificial assistance. Labor may occur, the os uteri be dilated, the membranes ruptured, and the uterine contents so reduced in size, that the whole organ, including the child, may return through the hernial opening, so that delivery may ensue, as in ordinary cases. In other instances, the contractions of the uterus may be sufficient to force the infant through the os uteri into the vagina, while the uterus itself remains externally, the child being pressed downward through the vaginal passage by the bearing-down efforts of the mother. An entire spontaneous delivery has under these circumstances perhaps seldom occurred; the assistance of the accoucheur is at least requisite to replace the uterus before delivery can be accomplished.

The prognosis, in cases of irreducible hernia of the uterus, must be generally unfavorable on account of inflammation, rupture, or even mortification; nevertheless, much may be expected from proper assistance.

The *treatment*, therefore, demands much judgment and scientific skill. The accoucheur should always make a judicious attempt as early as practicable to reduce the tumor by "*taxis*," taking care not to irritate the uterus for fear of causing abortion; the constant development of the uterus generally insures a very great enlargement of the hernial opening.

Should reduction be impracticable, it would be justifiable in most cases to allow gestation to proceed to the full period. After labor has commenced, and the liquor amnii has been evacuated, another attempt to reduce

by taxis should be made, as the uterus is now much reduced in size by the evacuation of the waters. Ruysch succeeded in reducing the uterus after labor had commenced.

No reduction being still practicable, it is possible that uterine contractions may be adequate to expel the child into the vagina. The patient should be forbidden to make any bearing-down efforts, which, under the circumstances, would retard the labor; while the contractions of the organ may be facilitated and rendered more efficient by pressure from the hands of the practitioner externally.

Gastrohysterotomy will be a final resource where other measures should fail, and afford hope for both the mother and her infant.

It is possible that the usual surgical operation for strangulated hernia of the intestines might in some cases be preferable to the Cæsarcan section. Certainly there would be less danger from a small incision requisite to enlarge the hernial opening than from the extensive incisions through the parietes of the abdomen and uterus demanded for the extraction of the infant and its placenta, involving much danger from hemorrhage, effusion into the abdomen, and subsequent inflammation.

We can conceive that occasionally it would not be justifiable to allow gestation to continue, for fear that the mother's life might be sacrificed. Hence, premature labor may be induced by measures formerly recommended. This operation may be difficult to perform, as the os uteri is generally beyond the reach of the finger. Kiwisch's method of cold or warm douches into the vagina would probably be successful; or perhaps a gum-elastic tube could be introduced within the os uteri, so as to inject water between the uterus and its membranes. In extreme cases, an external puncture with a very small trocar and canula may be made into the uterus, so as to evacuate the liquor amnii, care being taken to avoid injuring the child and also the placenta; the location of this last tissue may be ascertained by auscultation.

Prolapsus Uteri.—This complication very seldom exists at term, owing to the large size of the uterus, and its being therefore supported by the brim of the pelvis. If, however, the pelvis be large, the child small, and not much liquor amnii be present, the uterus may descend low into the pelvis, and press upon the perineum, even to such a degree as to cause flexion of the cervix. This is of much importance, for as the os uteri dilates, the edges will gradually retract on the surface of the ovum, so that, on its rupture, the presenting part of the child will press on the floor of the pelvis, while the os uteri approximates nearer and nearer to

the fundus of the uterus in proportion as the child descends, and the uterus diminishes in size.

If, however, the ovum be prematurely ruptured, the dilatation of the os uteri may be retarded, and if the bearing-down efforts ensue, the presenting part of the child may be forcibly driven against the posterior part of the neck of the uterus, where the cervix is flexed. No great delay will, however, occur. The patient ought to suspend all voluntary efforts, while the practitioner should employ the usual evacuating or relaxing measures, to facilitate dilatation, and he may elevate the whole body of the uterus during the absence of a pain, so as to release the pressure from the cervix.

Anteversio of the Uterus.—This should not be confounded with anterior obliquity of the organ. It has reference to the uterus when it is in the cavity of the pelvis; the fundus pressing against the pubis, and the os directed toward the sacrum. This displacement may increase the troublesome symptoms of pregnancy, and may sometimes, although rarely, be the cause of abortion; as the uterus, however, enlarges, the fundus will glide above the pubis and acquire its proper position, unless the abdominal muscles be greatly relaxed, when anterior obliquity may result, demanding the usual attentions.

Retroversion of the Uterus.—This displacement of

cially during the early stages. The author has met with innumerable examples.

Retroversion, also, is a very serious accident as regards the life of the fœtus, and, in some few instances, where the case has been neglected, also to the health and safety of the mother.

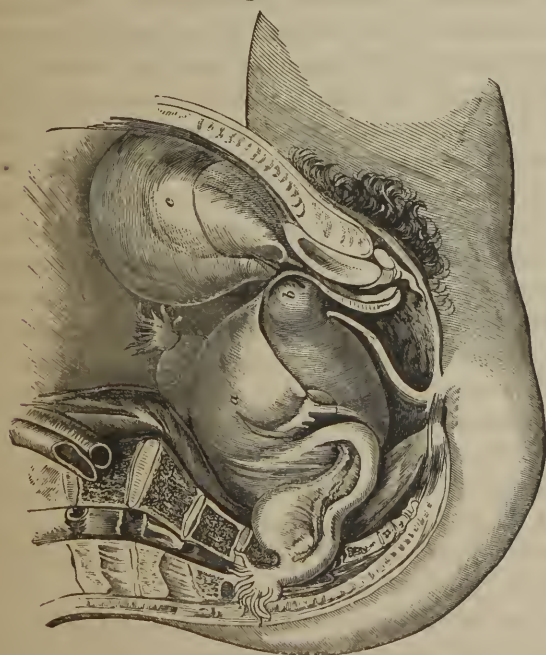
It is unnecessary to go into detail of the *causes* of this displacement in the unimpregnated condition:¹ they may be classed under the general head of relaxation of the ligaments and pressure from above. During pregnancy, where the uterus is larger and heavier, these causes are far more influential. Hence, pressure, from distension of the bladder, from a loaded condition of the intestines, and from the contraction of the abdominal muscles and diaphragm, are among the common exciting causes. Distension of the bladder has a special influence in determining this accident, from the position of this organ between the anterior walls of the abdomen and the body of the uterus. Hence, as it enlarges, the fundus of the uterus must be pressed backward toward and under the promontory of the sacrum.

Retroversion may, therefore, occur during pregnancy; but, we have no doubt, it often exists prior to pregnancy. Dr. Dewees asserted that conception hardly ever ensued when the uterus was thus displaced. This observation, although, in the main, true, yet, is not so universally. We have had many examples of conception when the uterus was retroverted; of course, continuing so after impregnation.

The *progress and consequences* should be carefully examined. The patient very soon suffers, more or less, from symptoms of "irritable" uterus, such as a sense of fulness in the pelvis, pressure, weight, bearing-down, frequent micturition, difficulty and, occasionally, impossibility of urinating, pain in defecation, sometimes so aggravated, that passage of the fœces is accomplished with excessive suffering, and, occasionally, it is impracticable. The intensity of these symptoms depend very much on the irritability of the tissue and the size of the uterus. They are, also, often productive of spinal and cerebral irritation, with their usual consequences.

Spontaneous Replacement not unfrequently occurs, as we have verified in many cases, especially where the tissues are not very sensitive. The explanation of this important fact is not easy, as it is opposed by the intestines lying upon the anterior surface of the uterus, and by the pressure of the abdominal muscles. If, however, the patient be quiet, in a recumbent position, if the bladder be kept empty, and if all straining

Fig. 97.



Retroversion of the Pregnant Uterus.—a, Fundus Uteri.—b, Os Uteri.—c, Bladder.

the uterus is very common during gestation, much more so, we believe, than is generally supposed, espe-

¹ Diseases Peculiar to Women, including Displacements of the Uterus. Hugh L. Hodge, M. D., Philadelphia, 1860.

effort be avoided, the fundus, as the womb is developed, will occupy more and more the hollow of the sacrum, extending toward its promontory. It is well known that the posterior part of the uterus, in pregnancy, is developed much more rapidly than the anterior, and, hence, greatly increases the influence of any distension of the rectum in elevating the top of the uterus: while the cervix is not impeded anteriorly in its disposition to descend from behind the pubis. There may be other influences exerted, but these, probably, will be adequate to effect a spontaneous replacement, all important for the welfare of the fœtus, if not of the parent.

Should this desirable change not ensue, and, especially, if the uterus be irritable, its unnatural position excites much irritation, which may be manifested, not merely by any increase of the nervous symptoms, but also by contraction of the uterine fibres. The consequence of such contractions will be the dilatation of the os uteri, and the expulsion of the ovum, and, of course, the death of the embryo. From much attention to this subject, the author has come to the conclusion that retroversion of the uterus, when persistent, is one of the most common causes of abortion, and that a very large proportion of those accidents, which have usually been denominated "habitual abortions," or miscarriages from habit, are, in truth, the results of nervous irritations of the uterus, arising from retroversion. His experience in the treatment of such cases fully confirms this opinion.

Should, however, there be no great nervous sensibility, the uterus may continue to enlarge, so that the most serious consequences may result to the mother as well as to her infant. The bladder, in consequence of enormous distension and other sources of irritation, often becomes inflamed. Hence, patients have perished from cystitis,—death being sometimes preceded by rupture or ulceration of the bladder with all its terrible consequences.

If the bladder be kept empty, similar inflammation will take place in the rectum, and the patient's life be endangered from ulceration or rupture of this intestine. In other instances, metritis or peritonitis, with fatal results, may be excited by the degree of pressure.

Notwithstanding these usual sources of irritation, some remarkable cases are upon record where neither abortion nor inflammation have ensued during the first four months, pregnancy persisting to the fifth, sixth, and, it is said, even to the ninth month of gestation. Dr. Ramsbotham mentions an instance which occurred to himself and his father, where retroversion continued until the sixth month, when the fundus spontaneously rose from the hollow of the sacrum, and gestation continued till the ninth month, with safety to the infant

and its mother. Cazeaux quotes a case by Dr. Billi, Professor at Milan, where the accident continued till very late in pregnancy. The os uteri was five fingers breadth above the pubis, while the fundus occupied the floor of the pelvis, greatly distending the posterior wall of the vagina.

The most remarkable instances of continued retroverted uterus are recorded by Dr. Merriman, junior. The first was a patient of Dr. S. H. Jackson; at the time of labor Dr. M. was present. The woman was regarded as being nine months pregnant, the whole cavity of the pelvis was filled by the tumor, while the os uteri was above the pubis. After several days, the uterus was nearly restored to its natural position, and the child was born dead. The second case was in the practice of Dr. Merriman, senior; labor occurred on the 16th of June, 1806, at which time the cavity of the pelvis was filled with an uterine tumor, portions of which could be felt per rectum, including the fœtus. The os uteri was so elevated above the pubis that it could not be reached; the membranes were ruptured the same day, severe labor pains set in, followed by rigors and convulsions. These were mitigated by treatment, and on the 20th, notwithstanding the continuance of pain, the pelvic tumor remained, and the os uteri could not be felt above the pubis. At this time a red discharge was apparent, the pains now increased and altered their character; and on the 21st, the tumor, which before had pressed upon the perineum, gradually receded, while a portion of the head of the fœtus could be perceived, in a softened, putrescent condition, descending behind the pubis. The uterine tumor ascended above the brim, and the os uteri surrounding the head could be felt high up. A puncture was made through the scalp, and, by traction effort, the whole mass was readily delivered; the patient perfectly recovered.

The *prognosis* in pregnancy with a retroverted uterus must, on the whole, be regarded as favorable; spontaneous restitution not unfrequently occurs; and if the resources of science be called into requisition in the early stages of pregnancy, the child, as well as its mother, very universally does well.

Nevertheless, as these cases are generally neglected, the result to the fœtus is often unfavorable; nervous irritation and contraction of the uterine fibres are too apt to ensue, producing an abortion. Doubtless a very large number of fœtuses have perished from this cause, and the mother's health been more or less injured by the repetition of these "miscarriages."

As regards the mother, death from this accident is very uncommon, although it is evident from the histories given, especially by the older writers, that this unfortunate event has sometimes occurred.

The *treatment of retroversion of the uterus* is a subject of great importance for the welfare of the mother, and the safety of the child; and our success will be the greater in proportion as a proper practice is instituted early in gestation. The longer the displacement continues, *cæteris paribus*, the greater will be the difficulty of reduction, and, of course, the danger to the child, and even to its parent.

Should, therefore, a married woman suffer, in addition to the common symptoms of pregnancy, any great difficulty of urinating, or much pain in defecation, accompanied by sensations of weight, pressure, pain in the region of the sacrum, spine, etc., a displacement of the uterus should be suspected, and a proper vaginal examination be immediately instituted. This becomes the more imperative should there be a complete retention of the urine, for fear the most serious consequences might result. Through inattention to these symptoms, and the ignorance which had existed in the profession, the young woman, whose case is so graphically described by Dr. William Hunter, in 1754, was allowed to perish. In Dr. Hunter's illustrations of the gravid uterus, the results of the *post-mortem* examination of this case are accurately depicted; the uterus occupying the cavity of the pelvis, its neck pressing against the pubis, and the urethra with the bladder enormously distended. Such accidents, in consequence of the discovery thus made, and the excellent advice given by this distinguished accoucheur, are now seldom observed, and perhaps never occur, when the patient has been under the superintendence of an educated practitioner.

If, on examination per vaginam, during the first few months of pregnancy, the uterus be found retroverted, the patient should be immediately placed in bed. The bladder should be emptied by the passage of a catheter. This is an operation, under the circumstances, not always easily performed, as the urethra is often lengthened out, sometimes compressed between the uterus and pubis, and is always directed upward parallel to the symphysis pubis. These facts being borne in mind, the experienced practitioner can very generally succeed in evacuating the bladder, especially if he employs a flexible catheter, which should be somewhat longer than the silver female instrument. The rectum should be emptied by enemata, and, if there has been much retention of fæces, cathartics also should be exhibited. The patient should be prohibited making any bearing-down effort, and she should avoid an erect, or even a sitting posture.

These measures are important, whatever practice may be subsequently instituted. The restoration of the uterus to its proper position, however, all acknow-

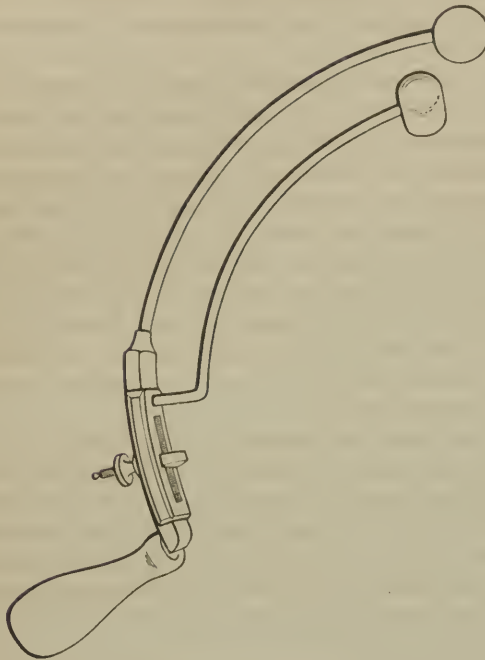
ledge to be most desirable. Some would trust entirely to the natural changes produced by pregnancy, contenting themselves with keeping the bowels open and the bladder emptied. We have already stated that there can be no doubt that a spontaneous restoration does frequently occur; and the remarkable cases, already detailed, of retroversion continuing to the fourth, fifth, and, in that of Dr. Ramsbotham, even to the sixth month, without injury to the mother or child, would seem to confirm the propriety of this practice. There can be no doubt, however, that in a large majority of cases, this passive treatment would be inefficient, and, after the third month of utero-gestation, would be fraught with danger to the mother, as well as to the foetus. The uterus ought, therefore, in all cases, to be reinstated.

Authors differ, however, as to the time and manner in which this replacement should be effected. Most advise that no time should be lost after the proper evacuation of the bladder and intestines, especially if the uterus be much enlarged. The operation usually recommended is to place the woman on her back, with the nates toward the edge of the bed, the shoulders and hips being elevated, and the lower extremities being flexed and properly supported by assistants. The hand of the practitioner being well anointed, should be introduced into the vagina in a state of supination. The extremities of the fingers should then be directed along the posterior part of the uterus as near to the rectum as practicable, so as to push the cul-de-sac of the vagina between the fundus of the uterus and bowel, thus elevating the upper part of the uterus from the hollow of the sacrum. This manœuvre may be assisted by the fingers of the opposite hand pressing on the hypogastric region near to the pubis, thus assisting the descent of the cervix, while the fundus is elevated.

This mode of operating is often successful, for the fingers internally not only elevate the fundus but pull down the cervix by means of the vagina, which extends toward the os uteri. Dr. Ramsbotham and others prefer placing the patient upon the side, while some think much advantage is gained by causing the patient to kneel on the bed, with the thorax and head depressed. It has been advised also to operate per rectum; the fingers then can be passed higher up toward the fundus of the uterus. To carry out this idea, M. Evrat has advised the employment of a long bougie with a padded extremity to be pressed into the rectum, so as to follow the retreating fundus. The late Dr. Bond, of this city, contrived an ingenious elevator. It consists of two curved steel rods, surmounted by ivory balls, running parallel to each

other, but separated by half an inch and united near the handle. They are movable upon each other, but

Fig. 98.



Bond's Uterine Elevator.

can be made firm by a screw. In their application, the longer rod is passed into the rectum and the shorter into the vagina, so as to operate simultaneously upon the fundus and posterior surface of the uterus. Dr. Bond has used it with success, and it has certainly the advantage of not producing any troublesome distension of the tissues.

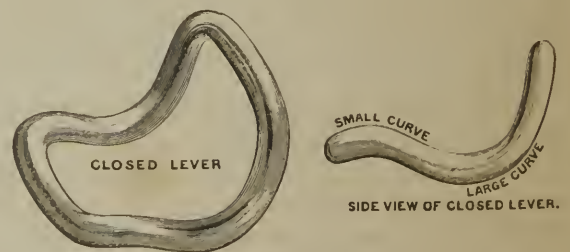
The objections, however, to all these modes of operating are great. The introduction of the hand or even the fingers excites severe pain, which distresses the patient, and may induce irritation of the uterus sufficient to excite abortion. It induces also great tenesmus, so that the patient can hardly refrain from strong bearing-down efforts, which, of course, counteract the attempts of the accoucheur. The action of the abdominal muscles is sometimes so great as to render the operation ineffectual. Hence, the exhibition of large doses of opium, the resort to anæsthesia, or, as Dr. Dewees has recommended, bleeding to syncope, have been found requisite to suspend such action.

Milder measures, therefore, have been proposed. M. Cazeaux informs us that M. Halpin, of Geneva, in 1840, having failed to restore the uterus by the usual means, conceived the idea of pressing all the contents of the pelvis upward by means of a bladder introduced

into the vagina between the fundus and the rectum. This being gradually distended, the body of the uterus was elevated, and the operation was completed successfully. The colpeurynter or gum-elastic bag and tube of M. Braun has been employed in the same manner, and with the like success. Many years ago, the author, in consultation with the late Dr. Wiltbank, attempted to reduce a retroverted and enlarged uterus by introducing a bladder into the rectum and distending it with air. The operation, however, failed, as the distension produced an intolerable tenesmus. M. Gariel, however, has been more successful; he introduced, in a collapsed state, a vulcanized india-rubber pessary or bag into the rectum; to this bag there was attached a long tube, through which air was injected, so as to distend it, and thus elevate the fundus of the uterus from its abnormal situation. In some instances, the pressure of a distended bag even in the vagina will induce much bearing-down effort, which will, of course, prove a powerful counteracting agency.

Pessaries have not been neglected in the treatment of retroverted uterus during pregnancy, but so little success has attended their employment, that they have been almost universally rejected when used as "elevators." Many, however, still recommend them *after* reduction, so as to prevent the return of the displacement; but even this modified use has been condemned by M. Cazeaux and others as unnecessary and even as dangerous, producing irritation which may be so great as to excite abortion. For many years past, however, after having tried the usual modes of treatment, the author has relied exclusively upon the lever pessary, both as an "elevator" of the displaced uterus, and also as a supporter to retain it in its proper position. The

Fig. 99.



Hodge's Lever Pessary.

great peculiarity of the lever pessary is its being curved, so as to correspond with the concavity of the sacrum and perineum. The upper extremity is carefully directed against the cul-de-sac of the vagina, and pressed steadily but firmly between the body of the uterus and the rectum, so as not to impinge against the uterus, or produce any pain or irritation. When the vagina is

sufficiently elongated, the finger of the practitioner, acting upon the lower extremity of the pessary, depresses it toward the perineum, and, of course, causes the elevation of the upper or sacral extremity which is opposed to the fundus uteri; thus using the instrument as a lever.

If the vagina be relaxed, or the uterus be not too firmly impacted, restoration may often be accomplished at once, without pain or discomfort. The pessary should be allowed to remain, and, if of sufficient size, will obviate all danger of a return.

Should, however, as is often the case in primiparous patients, the orifice and canal of the vagina be contracted and rigid, a small pessary may be introduced, and pressed upward for some time, when it may be left for a day or two, the patient being kept in bed. The operation may now be repeated, and perhaps a longer instrument may be introduced, and thus, by gradual measures, the whole body of the uterus may be elevated, and the restoration completely effected.

This gradual restoration of a retroverted uterus, during pregnancy, has much to recommend it, as,

First. It facilitates what may be termed the natural disposition to restoration, which, as already explained, is often effectual by the greater comparative development of the posterior portion of the uterus, and the distension of the rectum with feculent matters. A curved pessary gives greater efficiency to these natural tendencies.

Second. The operation may be, and ought to be performed without any severe pain or uterine irritation. The author's experience—by no means limited—confirms this remark. He has never known an abortion excited by the presence of a pessary; on the contrary, he has had the good fortune, in very many instances, of preventing miscarriages in females, who had been the repeated subjects of such accidents. "Habitual abortion" has often been destroyed by the use of pessaries.

Third. The lever pessary obviates any disposition to the recurrence of the displacement. Hence, after one or two days, the patient may leave her bed, and take moderate exercise in the open air, and thus escape all the irksomeness and disadvantages of confinement to bed for two or three months.

Fourth. This plan obviates the necessity of resorting to nauseating medicines, copious bleeding, opium, anæsthetics, or other powerful agents.

Fifth. If the pessary be employed, there will be no necessity of paying attention to the condition of the bladder and rectum; evacuation of the urine and feces will require no assistance from the practitioner.

Sixth. The mental relief afforded to the patient is by

no means a minor advantage of this practice. There is no dread of a severe operation, or of powerful remedies. The uterus is reduced without the consciousness of the patient, and she can return to her usual avocations without the fear that a displacement of the organ will again occur.

It has already been mentioned that many authors object entirely to the use of pessaries, even after the reduction of the uterus, fearing lest they may produce irritation. Of course, such irritation, and indeed much mischief may be excited by pessaries of corruptible material, improper form, or size, especially when unscientifically adjusted. We think, however, that the silver-gilt or hard india-rubber lever pessary, suitably curved and carefully employed, will obviate all these objections, and prove very advantageous in the elevation of a displaced uterus, and its subsequent retention in a natural position.

In all cases of pregnancy, complicated with displacement, pessaries should be worn until the end of the third month of utero-gestation, or even longer, if the pelvis be of large size or the uterus unusually small. After the fourth month they may be regarded as unnecessary, as the size of the uterus will prevent retroversion, and the organ will soon ascend into the cavity of the pelvis.

When the patient has, unfortunately, not been seen before the fourth month, and the uterus has become impacted in the pelvis, much must be left to the discretion of the practitioner as to the proper treatment; sometimes immediate restoration may be attempted by the hand, or the colpeurynter, which seems to be preferable. Probably, where there are no symptoms of inflammation, the lever pessary may be successfully employed; but the author cannot speak from experience under these circumstances.

Should, however, all means of restoration fail, it has been proposed by Denman and Merriman to leave the result to the natural processes, if there be no fever or inflammation, and simply to keep the patient quiet, and the bladder and rectum empty. The propriety of this advice is more than doubtful, for, with the single exception, which occurred to Dr. Ramsbotham, senior, where the uterus was spontaneously restored at six months, and the child survived, the continuance of pregnancy has been perhaps always followed with the loss of the fœtus, and must, in all cases, seriously compromise the welfare, and even the life of the mother.

Should, therefore, the uterus remain fixed, from adhesions or any other cause, after the fourth month of utero-gestation, and every proposed measure has been judiciously and perseveringly employed, the accoucheur

will be justified in producing an *abortion*, as sanctioned by Dr. William Hunter, Gardien, Ramsbotham, Cazeaux, and others.

This may be effected by the usual measures directed, when speaking of the induction of premature labor, (vide page 290.) The practical difficulty, however, is to reach the os uteri, which is sometimes situated very high above the pubis. This can generally be accomplished by curved sounds, bougies, etc., which may be directed through the os uteri, so as to dilate it or to rupture the membranes. In other instances, water may be injected, so as to separate the membranes, and thus bring on uterine contraction. Dr. Ramsbotham, senior, punctured the membranes, per os uteri, in a retroverted uterus at four months; in thirty-six hours the ovum was discharged, and the uterus was found restored to its natural position; the woman recovered after suffering for a long time from cystitis.

Should it be found impossible to excite the contractions of the uterus by any of the above measures, the organ may be perforated, per vaginam or per rectum, by a very small trocar and canula. It would be safer to puncture the inferior portion of the body of the uterus above the internal os through the vagina. The operation through the rectum has been performed successfully by Mr. Baynham, in 1830.

All such operations, however, must be the last resource of the accoucheur, as they are very dangerous, not merely from the puncture of the uterus, but from the necessary division of the peritoneum, with the probability of effusion of the liquor amnii into the cavity of the abdomen, which may excite severe or fatal peritonitis. The necessity for these operations will be greater when inflammatory symptoms have been already developed.

Procidentia Uteri.—Women who have borne many children, and when the perineum has been lacerated, or much relaxed, are liable, not only to retroversion, but to a still further descent of the uterus, so as to protrude outside of the body. This is very generally reducible, and often disappears in the recumbent position.

Under these circumstances, conception does not often occur, but when pregnancy does exist, it may happen that the uterus has been protruded externally, and thus remained until its enlargement prevented a subsequent reduction.

Gestation, thus complicated with procidentia, is rarely persistent; the irritation to which the organ is subjected usually excite contractions and premature

expulsion of the fœtus. Should this, however, not be the case, labor may eventually occur toward term; and if the child has still survived, it can generally be preserved.

Vimmer has recorded a case of complete procidentia continuing till term. Procidentia, however, is sometimes incomplete, as Cazeaux details an interesting case of a woman in labor, where the os and cervix uteri were exterior to the vulva, and did not retract during the process. The head of the child passed through the vulva before it was delivered at the os uteri. The child was five pounds and a half in weight, and measured eighteen inches in length.

Dilatation of the os uteri, formation of the bag of waters and their rupture, will be accomplished by the contractions of the uterus, as in ordinary labor; but it is evident that no assistance can be derived from the abdominal muscles for the expulsion of the fœtus, if the uterus be out of the pelvis. Indeed, all such bearing-down efforts will be positively disastrous, by forcing the intestines upon the uterus, endangering laceration of all its attachments, and the consequent death of the patient.

The careful and judicious accoucheur, when called during the early periods of gestation, would institute every practicable measure to return the uterus into the cavity of the pelvis, and prevent its subsequent descent by suitable pessaries. Should such measures fail, the patient must be kept in the recumbent position until the end of gestation, great attention being paid to the bladder and rectum, and also to the uterus, that all sources of irritation may be carefully obviated.

When labor takes place, and the os uteri is dilated, careful assistants should retain with their hands the body of the uterus against the pudendum, so as to prevent the bad effects of any bearing-down efforts of the mother.

If the contractile efforts of the uterus be not adequate for the expulsion, the uterus should be emptied, *secundum artem*, attending carefully to securing a proper presentation of the fœtus, to the perpendicular transit of such presenting part through the orifice of the uterus, and to its proper flexions and extensions; or if demanded, to render artificial assistance manually or instrumentally, as circumstances may demand. The placenta being removed, the uterus should, if practicable, be at once reduced within the pelvis, or as soon after labor as its diminished size may permit, and then suitable measures should be adopted for its permanent retention.

CHAPTER XXI.

DYSTOCIA.—COMPLICATIONS FROM THE MOTHER.—RIGIDITIES AND IRREGULAR CONTRACTIONS.

THAT simple physiological excitement, when inordinate or too long protracted, may be productive of mischief, is a fact familiar to every one. Muscular excitement is followed by fatigue, and, if protracted, by exhaustion and death. Constant mental occupation, inordinate indulgence of the moral sentiments and of the animal passions, debilitate and may ruin the strength and constitution of the individual. Debility, therefore, results indirectly from excitement.

The same truth applies not only to the nervous and muscular systems, but also to the organic actions. Long-continued hot weather and frequent repetition of hot baths, relax and debilitate. Alcoholic stimuli, which excite and give apparent strength, if persevered in, will be inevitably followed, sooner or later, by all the evidences of prostration.

LABOR COMPLICATED WITH INORDINATE EXCITEMENT.

During labor, therefore, where there is great nervous, muscular, and vascular excitement, the same results may be anticipated. Sensations of fatigue and of exhaustion follow almost every case of parturition; sometimes these are exceedingly great, and occasionally women die apparently from no other cause—many cases of this are upon record. Such inordinate excitements are often local, especially in the parturient woman. Hence, all authors speak of tedious labor arising from the resistances of the os uteri, perineum, etc., where there is no organic derangement and no alteration of structure; local excitements, spasms, etc., being the sole cause of delay.

RIGIDITY OF THE OS UTERI AND PERINEUM.—These local excitations are usually described under the expression of "Rigidity." To this word, if properly defined, there might be no objection; but it should be remembered that it is employed both in a physical and in a physiological sense. Physically, it is a pure me-

chanical force. Hence, induration of the os uteri, scirrhus or carcinomatous condition of the cervix, or a complete obliteration of the cervical canal, are pure mechanical obstacles to delivery; these are entirely different from rigidity dependent upon the nervous or vascular excitement, and demand, therefore, an entirely different mode of treatment. In labor, however, it should be borne in mind that both these states may be co-existent; there is always more or less excitement, and occasionally there is physical resistance from causes similar to those just mentioned.

"Vital Rigidity" and its consequences will now be considered as a complication of labor. "Physical Rigidity" will be noticed subsequently under appropriate heads.

Predisposing Causes.—These very generally depend on the peculiar temperament or constitution of the woman. Rigidity is often met with, therefore, among those who are plethoric, who have lived well, perhaps luxuriously, and have taken comparatively little exercise. It is often observed also in those of a "nervous temperament," in girls who are brought up in luxury, especially in large cities, whose mental and moral powers have often been cultivated at the expense of their physical being, who complain of languor and lassitude, who are pallid, anæmic, and are regarded as weak and delicate, but whose nervous systems are easily disturbed. They often excite the solicitude of friends, who consider them as too weak to endure the pains and exhaustion of labor. Such individuals may, however, have great and persevering rigidity of the os uteri and perineum, depending therefore, not so much on the degree of their vital powers, but upon the irritability of their nervous and muscular systems. Some of the most tedious and trying cases of rigid os uteri, which the author has met with, have occurred among ladies in our large cities, whose physical education had been neglected.

Experience, we think, abundantly confirms this observation. It is in the earliest stages of society, among savages, and in all countries among the laborious and

hard-working women, that the process of parturition is comparatively easy and free from danger. As civilization advances, as the refinements and indulgencies of life are multiplied, this important physiological function in the female economy is executed with comparatively more suffering, and accompanied by greater danger. Multitudes of women receive not, and seldom do they need the assistance, of an accoucheur; while in civilized society, all the science and skill of the most experienced practitioner is constantly held in requisition to ameliorate the suffering, and to preserve the life of the parturient woman.

The *cause* of this difference does not depend, therefore, simply upon the strength of the woman, but upon her peculiar temperament and constitution, and, also, upon the regular sequence of those natural changes in the tissues and organs which favor relaxation, and, as a consequence, the easy and rapid progress of parturition. The hard-working woman, therefore, who maintains, during the whole course of gestation, the activity of her capillary circulation, and an abundant discharge from all her secretory and excretory tissues and organs, has a great advantage over the refined lady, whose secretions are trifling, whose circulation is depressed, and whose nervous system is inordinately excited.

The age of a woman often predisposes to inordinate excitement. Hence, this complication is found more frequently in the young,—especially, in the first labor; also, it is said, in women who have married late in life. Tedious labors, therefore, from this cause, exist far more frequently among the primiparous than multiparous women. Much depends, also, on the peculiar idiosyncrasies of patients. Some women always suffer, more or less, from symptoms of rigidity, while, in others, such sufferings occur only in their first labors. Some women—especially among the laborious classes of society—are, however, delivered of their first-born with comparative ease and safety: the natural dispositions to relaxation are so perfect, that little resistance is offered to the exit of the child.

Exciting Causes.—These are, of course, very numerous. Anything which directly or indirectly excites the nervous or vascular system, will aggravate any predisposition which may exist. Hence, all mental and moral disturbances, all powerful impressions upon the mind and heart of the patient, may be productive of serious consequences. Hence, also, especially in the plethoric, over-stimulating diet and drinks, the occurrence of inflammation or fever, from any cause, will aggravate the symptoms; and all local irritations, which may disturb the general circulation or diminish the excretory functions, will be productive of mischief.

To these, should be added those special sources of irritation in the pelvic organs which may exist during labor, and which will be detailed in the progress of these observations; and, also, sympathetic irritations from other tissues and organs of the body, which may directly or indirectly disturb the uterine functions—such as hæmorrhoids, gaseous and feculent accumulations in the intestines, etc. Uterine excitement is, also, aggravated by local irritations in the vulva, vagina; also, during labor, by frequent “touching,” which not only irritates the os uteri, but may rupture the membranes. The premature discharge of the liquor amnii is, very universally, an aggravating cause, being followed, not merely by the tonic contractions, but, very generally, by powerful expulsive efforts of the uterus. Hence, the abdominal muscles and diaphragm are prematurely excited, and the phenomena of the second stage of labor complicate the first. In this way, not only are the sufferings of the mother greatly augmented, and her strength exhausted by unavailing efforts, but, also, the child is forcibly impinged against the cervix, increasing still more its rigidity.

The *Consequences* of this inordinate excitement are sometimes moderate, rendering the labor more tedious, and augmenting the sufferings and exhaustion of the woman. In other instances, however, they are productive of the most severe and dangerous accidents, to which the parturient woman and her child are liable.

Dangers to the child.—These arise from the inordinate and continued pressure to which it is exposed. So long as the membranes are preserved entire, it can be regarded as safe; but, when the uterus is emptied of the liquor amnii, the child and its appendages are compressed by the contractions of the uterus; and, when the bearing-down efforts commence, this contraction is very powerful, and sometimes the remissions are very trifling. The os uteri may remain undilated, and then the uterine contents will be powerfully compressed between two forces, the rigid cervix uteri and the bearing-down efforts of the parent. The placental functions will be disturbed, and also the circulation in the cord and body of the child. Hence, arise congestions, asphyxia, and, not unfrequently, the death of the fœtus. This, perhaps, is one of the most frequent causes of “still-births,” and explains why children are more frequently lost during the first than in subsequent labors.

These observations apply not merely to cases of rigid os uteri, but also to those from rigidity of the perineum. Many children perish after the head has safely passed through the os uteri, owing to delay at the outlet of the pelvis.

Dangers to the mother.—These are numerous and terrible: many of them are so important as to demand, hereafter, special attention under distinct subdivisions. They may be considered under two heads—General and Local Consequences of Rigidity.

The *general consequences* include increased pain, which is more constant than in natural labor. The process becomes tedious, and, hence, productive of sensations of weakness and exhaustion, which may be so great as to terminate fatally during or after delivery. The woman dies, says Dr. Churchill, of the “nervous shock,” or, rather, from the exhaustion of power.

Not only are the pains in the uterus augmented, but also those in other tissues and organs, especially in the region of the pelvis, extending to the sacro-sciatic nerves and those of the lower extremities, causing severe cramps. Irritations extend, also, to the spinal marrow and brain; hence, neuralgic pains and spasms in different portions of the body, and hence, also, nervous delirium, and hysterical affections. Sometimes the pain in the head becomes intense, and is often attended by blindness, tinnitus aurium, and even by violent convulsions.

Puerperal convulsions, or “eclampsia,” as they have been termed, are often produced simply by the inordinate excitement of the uterine functions, and are considered as one of the most alarming and dangerous consequences of the puerperal state. They are aggravated by the disturbance which also occurs in the vascular system. The violent efforts of the patient, and the disturbance of her respiration, are followed by congestions of the brain and spinal marrow, complicating the effects of pain and exhaustion. Such congestions are observed, also, in the viscera of the chest and abdomen, and may prove fatal, with or without the effusion of blood into the cavities of the head or body.

The violent excitement of the general system consequent upon rigidity is often manifested by the occurrence of fever with or without local inflammation. The skin becomes hot and dry, the face flushed, the pulse frequent and quick, with great thirst, and dryness of the mouth and fauces; there is restlessness, agitation, delirium, followed by collapse, or it may be, by death.

Locally, much mischief may also ensue, especially after the membranes have been ruptured; the fibres of the os become more irritated, with an augmentation of suffering, and sometimes the lips may become tumid from congestion or infiltration. In a few instances, especially in confined pelvis, and where the os uteri is thrown backward, the infiltration is so great as to be followed by effusion of blood. Hence, a thrombus, or bloody tumor, sometimes appears upon the anterior portion of the cervix, even projecting at the vulva.

Cazeaux quotes from Montgomery, Nægele, and several other authors, examples of this accident. In other instances, the continued pressure and irritation of the cervix may be followed by inflammation, and even by gangrene and sphacelus.

More frequently, however, a partial dilatation of the os is effected, against which the child is forced; eventually the tissues give way, and the child escapes in consequence of laceration of the cervix uteri to a greater or less extent. Several instances are upon record where the resistance of the os uteri was so great, and the parturient efforts so powerful, that a complete circle of the cervix has been torn off. A case of this kind is recorded by Dr. Wm. P. Johnston, of Washington city, in *Amer. Jour. Med. Sciences*, for April, 1851.

Unfortunately, such lacerations are not always confined to the cervix, but ruptures may occur in the body or fundus of the uterus, through which the child may escape into the cavity of the peritoneum; the unhappy woman, under these deplorable circumstances, usually perishing from hemorrhage and nervous prostration.

Rupture of the uterus and of the upper part of the vagina involves many important considerations, which will be soon noticed in detail.

There are cases, however, where none of these lacerations result from undilated os uteri; the uterus, after ineffectual efforts during a longer or a shorter period, falls into a state of exhaustion; its contractile powers, and those of the abdominal muscles, are exercised at longer intervals, and with less efficiency, so that eventually action ceases entirely, and without artificial assistance the patient will generally die undelivered.

Rigidity of the Perineum is sometimes productive of serious, and occasionally of fatal accidents. The head, having escaped from the os uteri, is arrested at the floor of the pelvis; the contractions of the uterus become more vehement, so that pressure is exceedingly great against the tissues of the perineum, and also on the nerves of the pelvis. The common pains of labor are excessively aggravated, and severe sufferings are often experienced on the inside of the limbs from pressure on the obturator nerves, and there are also cramps and spasms, with intense agony from pressure on the sacro-sciatic plexuses. Such irritations are often propagated to the spinal marrow and brain, disturbing their functions, and often exciting violent spasms and convulsions.

If, under the influence of such efforts, the perineum should gradually yield, the child may be born, after protracted suffering. More frequently, more or less laceration ensues. In primiparous women, the frænum perinei is generally found to be torn. In other cases,

the laceration interests the mucous membrane along the posterior part, and occasionally on the sides of the vagina; while at times the laceration extends through the whole thickness of the perineum. When proper attention is paid to the patient, it is very rare that such lacerations are productive of much mischief. They generally occur at the moment at which the head passes, and are limited to the anterior perineum. After labor, the parts collapse to such a degree that adhesion supervenes between the lips of the wound, so that no bad consequences result. The orifice of the vagina remains generally larger than before, and in subsequent labors seldom affords much resistance.

Unfortunately, however, more serious accidents may occur, demanding very frequently the assistance of the surgeon. It is found, that a rupture, commencing in the mucous membrane of the vagina, has extended through the perineum and anus, throwing both orifices into one, and often accompanied with considerable hemorrhage. In such instances, there is danger of a permanent recto-vaginal fistula, or even of a common cavity through which there will be constant and involuntary discharges of feculent matter. To prevent, or to cure this horrible condition of the patient, surgical assistance should be rendered. The resources of nature, however, in such cases, are wonderful. The author has met with at least two cases where such ruptures of the rectum have occurred, and where the patients, without artificial assistance, have so completely recovered, that feces, unless in a fluid condition, never escaped involuntarily.

It has happened under peculiar circumstances where the os vaginae did not yield, that the child has been born through a complete perforation of the perineum. Such perforation may be of the anterior or posterior perineum.

When anteriorly, the head usually ruptures the recto-vaginal septum, and the anterior portion of the anus, and passes, therefore, through the orifice of the rectum, enlarged by a laceration of its anterior portion, the orifice of the vagina remaining intact. Strange as it may appear, considering the small size of the anterior perineum, which is but one inch in length between the vagina and the anus in the unimpregnated condition, the child has been delivered through a rent in this anterior perineum, without any lesion of the orifices of either the vagina or rectum; *à priori*, such accidents may seem to be impossible, yet learned and experienced accoucheurs detail cases of this character. Velpeau mentions one which was observed by himself, in which the whole posterior margin of the orifice of the vagina was perfect, while the orifice of the rectum, with its sphincter muscle, remained intact, the laceration

extending on either side of the perineum. Similar cases are recorded by M. Coster.

Posteriorly such perforations are more common, owing to the greater extent of the posterior perineum. The child has passed, therefore, on the right or left of the rectum, and been delivered through a lacerated opening, which has not involved either the anus or the vulva.

Doubtless many of these lacerations might have been prevented by suitable medical and surgical measures, and especially by giving a proper scientific support to the perineum during the process of descent. Nevertheless, their occurrence has, in some instances, been unavoidable.

The causes may, perhaps, be referred to two general heads:—

First. To the undilatable character of the vulva and anterior perineum; and,

Second. To the wrong direction in which the uterine forces operate.

Ruptures of the perineum, as already mentioned, may be attended with hemorrhage; it occasionally happens that blood is effused into the areolar tissue, forming large sanguineous tumors, which may interfere with the progress of delivery. Sometimes such tumors may exist without laceration of the perineum, arising from great engorgement of the vessels, aggravated by the continued pressure of the child. They are found on the sides of the vagina, the perineum, and occasionally on the labia pudenda. Where the pressure has not been great, simply a serous effusion takes place, causing oedema of the vulva, which occasionally, although rarely, interferes with the delivery of the child.

Non-dilatation of the perineum may arise, not only from vital rigidity, as already described, but also from deformities of the os vaginae, from thickness, or the induration of its tissues, from cicatrices, from the presence of polypi, carcinoma, and, indeed, any other mechanical obstruction.

Perforations occur frequently, because the whole uterine forces are directed chiefly upon the posterior perineum, as is observed in occipito-posterior positions of the vertex, in some positions, it is said, of shoulder presentations, but more especially in cases of deformed pelvis, especially where the sacrum is too straight, or too near the pubis, or where the os coccygis is ankylosed, or turned too much inward, and also where the rami of the pubes and ischia approximate too closely, making the arch of the pubis too angular. In all such instances, the proper extension of the head cannot occur, and it is determined inordinately against the floor of the pelvis.

Sometimes considerable hemorrhage accompanies such perforations, but seldom, to a dangerous extent. Extensive and severe as are these lacerations, patients generally do well, even without surgical assistance; the orifices of the vagina and rectum with their sphincters being uninjured, the torn tissues collapse, and come into very close contact, so that, under moderate inflammation, adhesions rapidly ensue. It is merely necessary to keep the patient perfectly quiet, her limbs close to each other by a bandage, and warm emollient washes carefully applied. In this way, says Velpeau, the parts often heal very kindly, as in the case above reported by him, where the anterior perineum was ruptured, the wound healed, leaving hardly a perceptible cicatrix, which did not interfere with subsequent deliveries.

Occasionally, however, there is more severe inflammation, abscesses may form, some sloughing may occur, and even fistulous openings may remain, demanding surgical attention. If, however, there be no other complication, the patient generally recovers.

Rigidity of the perineum may, however, be followed by more serious consequences. The tissues not yielding, the powers of the uterus and of the patient may be exhausted, and she may perish undelivered. While, in other instances, the vagina becomes more and more elongated, especially at the upper portion, by the continued ascent of the os uteri over the body of the child, so that rupture of the upper portion of the vaginal tube interesting the peritoneum may result. The phenomena of labor are suspended, hemorrhage and prostration ensue, the child not unfrequently escaping through the rent into the cavity of the abdomen. From the same cause, also, rupture of the uterus may sometimes arise, with the usual symptoms of collapse; the presenting part of the child occasionally receding into the abdomen, while, in other cases, it remains movable in the cavity of the pelvis.

Diagnosis.—The diagnosis of vital rigidity in the os uteri and perineum is generally easily determined. On examination per vaginam, the tissues will be found unusually dry, the orifice and canal of the vagina small and contracted, and also preternaturally sensitive. The os uteri will be found comparatively undilated, and, if the pains be severe and long-continued, its edges will usually be very thin, and there is often no projection of the lips into the vagina. Occasionally, however, the lips are thick; nevertheless they are firm, even during the absence of a pain.

The contractions of the uterus rapidly become more and more intense, and the accessory powers are brought into action, the patient complaining, not only of pains in the sacral region, but also in the loins, and down

the limbs. She becomes restless, nervous, agitated, and is conscious that her "pains are doing her no good." This state of things may continue for hours, and even for days. Usually the membranes rupture, which affords some temporary relief, but generally the bearing-down efforts are augmented and become more frequent, aggravating all the symptoms. The os uteri, perhaps, gradually dilates, but sometimes, for hours, manifests little change. In other instances, the membranes may remain entire; the bag of waters even may form, but in this case it is small, and of a cylindrical shape. If the liquor amnii be not abundant, there is little or no projection of the membranes. The young practitioner may occasionally be deceived, and even suppose that there is no os uteri, as the whole lower segment of the uterus is very thin, closely applied to the head of the child, and the tense membranes, slightly protruding, so occupy the uterine orifice that the line of demarcation between them and the attenuated lips of the os can hardly be distinguished, even during the absence of a pain.

Attention should be paid to ascertain the location of the os uteri, whether it be central, and parallel to the superior strait, or whether it be oblique. As already mentioned, obliquities of the uterus may augment rigidity by determining the pressure of the head too much against the anterior or lateral portions of the cervix. If there be no obliquity of the uterus, the os uteri may, nevertheless, be displaced, owing to a flexion in the cervix and body, so that the opening may be turned toward the sacrum, while the presenting part of the child is driven against the anterior part of the cervix. It should also be ascertained whether there is any disposition in the os uteri or perineum to yield as labor advances, and whether it be a pure case of "vital rigidity," or complicated with any mechanical obstruction, such as indurations, scirrhus, contractions, adhesions, tumors, etc.

Although the operation of "touching" is all-important, yet, nevertheless, it should not be too frequently resorted to, as it produces more or less pain, and aggravates the irritation of the parts.

Treatment.—Such being the character and the dangers of the inordinate excitement of the pelvic tissues during labor, the proper management becomes of the utmost importance. As Dr. Dewees observes, there is no more frequent complication of labor, or one more productive of dangerous consequences to the mother and the child. It may be added, that there are few complications which demand the more sedulous attention and the best exercise of the judgment and skill of the accoucheur.

The *indications* for treatment are very clear:

First. To remove all the exciting or aggravating causes; and,

Second. To diminish, by direct or indirect measures, the vascular and nervous excitement, both general and local.

In fulfilling the *first indication* all mental and moral excitations should be avoided; unnecessary company should be excluded, conversation with the patient should be turned upon agreeable subjects so far as practicable; and her anxieties should be quieted by presenting the most favorable prospects consistent with truth and duty. In addition every source of physical disturbance should be removed; the apartment of the patient should be kept cool and well ventilated; and all hot and stimulating drinks and food should be avoided. The most simple diet and drinks should be administered, while irritations arising from the condition of the stomach, bowels, and especially from the rectum, should receive sedulous attention. The urine should not be allowed to accumulate in the bladder; and no sources of irritation should be permitted to exist about the vagina or vulva.

The *second indication* may be met either by general or local measures. The former, however, although mainly directed to the general system, are exceedingly efficacious, locally. They operate by diminishing the nervous and vascular excitations, and thus lessening pain and the inordinate spasmodic contraction of the uterus and abdominal muscles; and moreover, at the same time, they promote the return of all the various secretions and excretions of the tissues. They favor, therefore, and often insure that "relaxation" of the os uteri, vagina, and perineum, which is so universal in healthy women, and which so greatly facilitates the process of parturition.

Of the general measures, some are directed more exclusively to the vascular and others to the nervous system. The former include the whole series of evacuating remedies which are usually known by the word "antiphlogistic." Although in labor, inflammation or fever are not frequently present, yet the excitement is so great and dangerous as to demand rapid and efficient redaction.

Of *evacuating measures*, nothing is comparable to the *loss of blood*.

We have already contended that there is a natural disposition to plethora during pregnancy, and we feel confident that women, during the latter periods of gestation, and during labor, bear the loss of blood better than under any other circumstances. Venesection, therefore, during labor complicated with rigidity, may very frequently be resorted to with the greatest possible advantage. The profession is much indebted to

the late Dr. Dewees for pointing out the advantages derived from free blood-letting in the parturient state, and the extent to which it may be carried with impunity. In 1796 he employed it in a bad case, even *ad deliquium animi*; and in his thesis published in 1805, he proclaimed that by the use of the lancet the sufferings of parturient women could almost be abolished. Making some allowances for too enthusiastic devotion to this remedy, and for the fact that, in our large cities, women sixty years ago enjoyed more vigorous constitutions than at the present day, the practical truth, that the best effects in labor complicated with rigidity may be obtained by the free use of the lancet, constitutes a principle of the utmost importance. Dr. Ramsbotham, Jr., is not favorable to the employment of bleeding in the first stage of labor for simple rigidity, stating that in a Charity Hospital, where two thousand women are delivered every year, bleeding was hardly ever resorted to. On the contrary, Dr. Hamilton, of Edinburgh, affirms that the first stage of labor should not be protracted more than twelve or fourteen hours, as venesection would always promote relaxation. The loss of blood, by diminishing the general vascular excitement and plethora, calms the mental and nervous agitation, moderates pain, prevents or relieves cramps, spasms, and convulsions, and promotes free perspiration, and all secretions and excretions. Under its influence, therefore, the spasmodic action of the muscular fibres of the cervix uteri and those constituting the muscular floor of the pelvis are often relieved, and an abundant secretion is observed in the os uteri and on the mucous membrane of the vagina and vulva, while the whole tissues of the perineum become softened and relaxed by an interstitial exhalation.

Perhaps there are but few practitioners who cannot bear testimony to the speedy and wonderful effects of the loss of blood where there is great vascular excitement. It has often happened to the author that the relaxation of the os uteri has ensued so quickly that the child was born before the flow of blood from the arm could be arrested. As Dr. Churchill states, the occurrence of syncope forms no objection to the operation, and Dr. Dewees was in the habit of making patients stand or sit erect and then bleeding until complete faintness was produced. In our experience this is very rarely necessary, the good effects of venesection being obtained very generally, when no disposition to faintness is manifested. On the contrary, patients usually express, in the strongest language, their sense of relief, both mentally and physically, after the loss of some fifteen or twenty ounces of blood.

This mode of evacuation, however, is not suited to

all cases, and should seldom be employed in purely nervous or anæmic women. Much judgment, therefore, is required in adapting it to suitable cases, so that no permanent injury should result to the patient's constitution by its too free employment. The objection urged by Dr. Ramsbotham, that uterine action might be too greatly diminished, and thus a predisposition to post-partum hemorrhage be induced, is not verified by experience.

The loss of blood, while it diminishes the sufferings and dangers of the patient during labor, greatly contributes to the prevention of pelvic and abdominal inflammations after delivery. The "getting-up" is more favorable, and the disposition to the mammary secretion is not impaired.

Other evacuants are also important in the treatment of rigidity, either as substitutes or accessories to the lancet.

Much, therefore, may be gained by large *enemata*, so as to remove sources of irritation in the rectum and colon. If the labor be prolonged, nauseating *laxatives* are valuable; the oleum ricini is preferable, carrying off all acrid ingesta, and facilitating the secretions. In a few cases it may be assisted by the prior administration of some mercurial preparation.

Nauseating Remedies have received much attention, especially, since Dr. E. Kennedy, of Dublin, suggested the employment of tartarized antimony, to the extent, occasionally, of complete emesis, carrying out the surgical principle of producing muscular relaxation by exciting nausea and confirming the adage of the nursery, that "sick labors are easy labors." Ipecacuanha has also been much employed, and is, occasionally, preferable to the tartar emetic—especially in delicate women—as its influences are more transitory, and not apt to be followed by symptoms of languor and exhaustion, which are often produced by antimonial preparations.

Under this general head should be included all the variety of diaphoretic and diuretic remedies, embracing the alkalies, and also the neutral salts, all which have a tendency to diminish vascular excitement, and to facilitate the various excretory functions. Generally, such medicines should be exhibited in combination, as usually prescribed in febrile and inflammatory diseases.

Warm Baths have been recommended as a substitute, but more frequently as an accessory to the above measures. Properly employed, there can be no doubt of their occasional utility; but the difficulty, in private practice especially, of having the necessary conveniences, the great effort which it usually requires on the part of the patient, and the danger of taking cold

from its improper administration, must greatly limit its employment. At best, also, it is adapted to comparatively few cases, being inadmissible where there is great vascular excitement, or inordinate determination to the head.

Local baths, fomentations, etc., are far more manageable and important. A warm hip bath, therefore, sitting over the vapor of hot water, warm fomentations or poultices to the pudendum, are, practically, very advantageous.

Large quantities of warm water or mucilages thrown into the rectum, not only contribute to the escape of gaseous and feculent matters, but have a very decided influence in promoting the relaxation of the tissues of the pelvis.

Similar injections have like good effects when thrown into the vagina, facilitating a dilatation of the os uteri, and the dilatability of the vagina and vulva. Some practitioners are very fond of oleaginous preparations by themselves or added to the mucilages. Our habit has been, for many years, to anoint the external parts freely and frequently with lard, and also to introduce large portions as far as possible into the vagina; very good effects have resulted from this practice.

Our treatment must sometimes be almost exclusively directed to the "*nervous system*;" as rigidity of the tissues depends often, in delicate and anæmic women, more upon nervous irritation than upon vascular excitement. At the bedside we recognize generally more or less disturbance of both the vascular and nervous systems; if the former predominate, evacuating remedies demand our first attention, but they must be accompanied or followed, in many instances, by the exhibition of anodynes. There are cases, however, where evacuants cannot be borne, and where all confidence must be mainly placed upon remedies addressed to the cerebro-spinal system, that irritation, spasms, pain, and even severe spinal and cerebral excitements, may be subdued.

Opium, and its various preparations, have, from time immemorial, enjoyed the confidence of the profession; and certainly no one article has contributed so much to the amelioration of the sufferings and dangers of the parturient woman. Nevertheless, it has been so indiscriminately given, under the ever varying conditions of labor in women of different temperaments and constitutions, that much mischief, often irreparable, has resulted from its employment.

The rules for the administration of opium are, however, exceedingly simple; any existing source of irritation which can be detected should be previously removed as far as practicable; and care should be taken that all inordinate excitement of the blood-vessels, all

plethora, and especially any existing congestion of the brain, heart, lungs, etc., be diminished by appropriate measures. Opium, then administered, manifests its delightful influences, quiets mental and moral excitements, diminishes suffering, lessens spasms, prevents or relieves headaches and convulsions, and, when conjoined with the neutral salts and diaphoretics, greatly facilitates the return of the secretions and the relaxation of the tissues.

Other narcotic articles have also been exhibited in cases of rigidity. Camphor has been much employed, and Dr. Dewees speaks of it favorably. Hyoscyamus, and lactucarium, have also been usefully employed in many instances where opiates were inadmissible, from any peculiar idiosyncrasies of the patient. Small and frequent doses of *belladonna*, taken internally, have been especially recommended by many, who maintain that this article, which produces dilatation of the pupil of the eye, will have a similar effect, when internally exhibited, on the os uteri. Attention of late years has also been fixed upon the *cannabis indica* as an oxytocic.

Tobacco has also been used to promote relaxation of the os uteri. During the nausea which occurs from its influence, the muscular system is greatly relaxed, and, therefore, it may be useful in all cases of spasmodic rigidity of the os uteri, and of the muscles of the perineum. Dr. Dewees was, however, disappointed in one case in which he employed it. Few accoucheurs, however, have ventured upon its use, as the prostrating effects are so great that serious, and even fatal collapse has been the result.

At the present time no measure for diminishing the sufferings of parturition occupies the attention of the profession as much as the inhalation of *ether* or *chloroform*. On the 30th of September, 1846, Dr. Morton, of Boston, extracted a tooth from a patient without giving pain, while under the influence of the inhalation of ether. Dr. Hayward, of Boston, in consultation with Dr. Warren, on the 7th of November, in the same year, amputated the thigh while a patient was insensible under the influence of ether, administered by Dr. Morton. A report of these cases had an electric influence upon the public. Professor Simpson, of Edinburgh, was the first to suggest its application to obstetrics, and on the 19th of January, 1847, having etherized a woman with a deformed pelvis during her labor, delivered her by the operation of version. In the succeeding February, Dr. Fournier Deschamps imitated Dr. Simpson's example, in France, and on April 7th, 1847, Dr. Keep, of Boston, and on the 5th of May, of the same year, Professor Channing introduced the practice into America.

Reports from all these experimenters were so satisfactory that the enthusiasm of the profession and of the public arose to a great height, and many imagined that the pains, anxieties, and "sorrows" of the parturient woman would hereafter be abolished. Such high-wrought expectations have, of course, not been realized.

The whole subject has since been very thoroughly canvassed, and a careful examination of all the facts and arguments presented in favor of *anæsthesia in labor*, and of those which have been arrayed against its administration, will enable us to come to much more rational conclusions as to the real value of *anæsthetics* in obstetrics.

When freely administered, the ultimate effects of ether and chloroform seem to be very similar, both producing so complete an *anæsthesia* that the individual becomes insensible to pain, and muscular contraction is suspended. To obtain these effects by *Ether*, requires, comparatively, a longer time, and a larger dose. *Chloroform* acts very rapidly, and in small doses; perfect insensibility and prostration, and, in some instances, death has resulted in the course of a few minutes, where twenty or thirty minims of chloroform had been employed. So great rapidity, however, is not common; and chloroform, therefore, is often recommended, as being more economical and portable.

Chloroform is far more pleasant to the smell, has less pungency, and produces less irritation of the nostrils, fauces, etc., than ether; it also is seldom preceded by the nervousness, agitation, and hysterical symptoms which often appear before etherization has had its full influence, and, says Dr. Simpson, its effects are more complete and persistent.

The Edinburgh professor, therefore, and almost all the Continental accoucheurs, give a decided preference to the employment of chloroform. In this country, however, although this agent has been much employed, etherization is far more generally adopted, as being safer. Death from the administration of ether, notwithstanding its almost universal employment in severe surgical operations, has very rarely, if ever, occurred; while deaths from chloroform have been frequently recorded. This has been attributed to the impure character of the article, to its careless exhibition, to its cumulative influence, etc.; but whatever may be the true explanation, the fact of its occasional fatal effects cannot be denied. Strange, however, to say, that, as yet, no positive case has been recorded of death from the inhalation of chloroform during the process of labor. Dr. Ramsbotham, of London, details one very interesting case, in which a lady had a slightly deformed pelvis, requiring, in her first labor,

the use of the long forceps. In her second labor, she was safely delivered, when under the influence of chloroform. In her third labor, delivery was also accomplished under similar circumstances. For an hour and a half she was very comfortable; but she was then seized with dyspnœa, accompanied with extensive lividity of the face, and evidences of engorgement of the lungs and heart; these phenomena vanished, but, at the expiration of three hours and a half, dyspnœa returned, followed by convulsions and death. Dr. Snow, who has devoted much attention to the subject of inhalation, did not regard this unfortunate termination as the result of chloroform, but it was so considered by Dr. Ramsbotham, and by the experienced and skilful physician who had charge of the patient.

A preference, therefore, should be given to ether, since chloroform cannot be considered entirely free from danger; as Dr. Meigs has expressed it, what comfort can any practitioner receive, who is so unfortunate as to have a patient die under the influence of chloroform administered for the relief of pain!

"*Amylene*," and various other articles, have been also used as anæsthetics, but, as yet, they have not obtained general confidence.

As to the *effects* of anæsthesia upon the parturient woman, they may be summed up under the following heads:—

First. The primary influences of etherization are stimulating. The pulse often becomes more frequent, the skin warm, the face flushed, etc. The patient becomes nervous, the mind agitated and disturbed, slight delirium begins, attended by jactitation, and often by spasms of the muscular system.

Second. These symptoms are followed by comparative quiescence; the mind becomes tranquil, the patient appears to be unconscious, and her sensibility is diminished, although there is still some rigidity of the muscular tissues, and her mental operations may be easily excited. Many individuals, in this state, often become very insensible to pain, and yet are, by no means, completely under the influence of ether.

Third. When anæsthesia is carried still further, the voluntary muscles are completely relaxed, sensibility is entirely suspended, and the patient unconscious; she appears to be in a quiet slumber, very different, we think, from the state of inebriation produced by alcoholic stimuli.

Fourth. If the anæsthetic influence be still more profound, it is extended, more or less completely, to the involuntary muscles, and the stupor of the patient will be still further augmented. The action of the abdominal muscles in labor are suspended, followed by a cessation of uterine action.

Fifth. If the anæsthetic influence be augmented, respiration will be stertorous, the pulse becomes feeble, and there is lividity about the mouth, lips, etc., and the patient may quickly perish from syncope or asphyxia. The recurrence, therefore, of these symptoms, will always indicate the necessity of suspending the process, and resorting to the free admission of fresh air, and the use of stimuli to resuscitate the patient.

Although these phenomena are variously modified as to the rapidity of their occurrence, and as to their intensity, by the idiosyncrasies, temperaments, constitution and health of individuals, yet they may be regarded as characteristic of the different stages of anæsthesia. The stage of excitement is sometimes very great, and even prolonged, while in other instances, especially when chloroform is employed, it is exceedingly short, indeed hardly perceptible. The latter, Professor Simpson considers as desirable, and advises that the full influence be therefore produced as rapidly as possible; while Mr. Rigby and others prefer the gradual inhalation, so that anæsthesia may be induced more slowly, and therefore, they think, more safely.

Much discussion has existed as to the influence of anæsthesia upon the perineum, os uteri, and body of the uterus, and also upon the abdominal muscles and diaphragm, some contending that the effects in these tissues are trifling, and others that they are very decided, especially as regards the perineum and the os uteri. The testimony of practitioners seems to prove very positively that all the rigidity which depends on muscular excitement, often so great as to cause spasms, will be relieved by anæsthesia; the tension disappears, and the tissues become relaxed: but where the rigidity depends more upon vascular excitement, or upon any physical condition of the parts, there is comparatively little or no relaxation.

M. Cazeaux, although he has known some cases of relaxation of the *perineum* when chloroform has been used, yet declares, that in many instances, this does not occur. He mentions a case under the care of M. Danyau and himself, where deep incisions on each side of the perineum were demanded, although the patient was completely anæsthetic. He quotes also three cases in the practice of M. Villeneuve, of Marseilles, where rupture of the perineum ensued, the patients being deeply under the influence of chloroform. He adds that such instances may possibly arise from the dense character of the aponeurotic tissues of the perineum, or from the collection of fatty matters in the floor of the pelvis.

There is reason to believe that the muscular fibres of the perineum yield more readily than those of the *cervix uteri*, which demand a more profound state of

anæsthesia. Nevertheless, according to the report of excellent authorities, the most decided influence is often produced by anæsthesia upon the cervix uteri.

As regards the *body of the uterus*, the testimony is more conflicting. Many practitioners formerly, and some even at the present time, affirm that the uterine contractions are augmented by the inhalation of ether. This does not seem to be correct, although in a large number of cases there seems to be no great diminution of uterine energy, even after insensibility has been produced. There can be no doubt also that in decided cases of anæsthesia, uterine action may be not only diminished, but entirely suspended. This is acknowledged even by Professor Simpson, the great advocate for anæsthesia in labor. This fact has been urged by Dr. Ramsbotham and others as an argument against this practice, as thus labor may not only be retarded, but suspended. They fear also that the contractions may not return, and that the womb may fall into such a state of atony, that there would be the great danger of post-partum hemorrhage. M. Cazeaux is timid upon this last point, and even advises that ergot should be simultaneously administered, so as to counteract any predisposition to inertia; and Dr. Montgomery, of Dublin, who is friendly to anæsthesia, details several cases in which hemorrhage resulted after delivery.

The fears, however, of practitioners on these points, have not been confirmed. Professor Simpson positively asserts that in a few minutes after the suspension of the inhalation, and the free access of fresh air, the uterine contractions will return with their usual intensity. Others, however, insist that such return is often slow, and therefore there is a retardation of labor. As regards post-partum hemorrhage, few individuals at the present time are disposed to trace it, in any instance, to etherization; this accident so often occurring under ordinary circumstances.

Most practitioners are so convinced of the power of anæsthesia to suspend uterine action, that they strongly recommend it in all important obstetric operations, especially in that of version. Many cases are recorded, where turning, otherwise impracticable, has been easily effected after etherization. Exceptions to this declaration have no doubt been met with; but the general fact may be regarded as correct.

That the *abdominal muscles and diaphragm* are affected by anæsthesia, there can be no doubt; and thus, the bearing-down efforts of the mother, as distinguished from uterine contractions, will be lessened, and thus far the process of labor will be retarded. It must be remarked, however, that this diminution of action is by no means so great as is observed in the other voluntary muscles; inasmuch as the muscular parietes of the

abdomen are intimately connected with the respiratory function, and depend for their action very much on the reflex influences of the spinal marrow. The complete suspension of their functions is only to be observed in cases of profound anæsthesia. M. Cazeaux makes this observation, and quotes M. Longet, of Paris, and M. Bouisson, of Montpellier, in confirmation. He also states in unison with Professor Channing, of Boston, that even when the abdominal muscles continue to act, it seems to be rather a spasmodic action connected with the disturbed respiration than a regular bearing-down effort.

The comparative inaction of the fibres of the uterus and of the abdominal muscles during anæsthesia, seem to us very analogous to what is often observed during puerperal convulsions, where there is generally partial suspension of the expulsive efforts of the woman, which become irregular, spasmodic, and very inefficient. Where inhalation has been employed, it is a happy circumstance that all such inertia of the powers of expulsion are temporary; they soon pass off, and labor progresses often with its usual energy.

It is a great blessing, however, that complete *insensibility* will very often be produced where muscular excitement is but partially diminished, and hence that labor may be continued, perhaps accelerated, without the consciousness of the patient.

It has been further objected to anæsthesia, that it may predispose to or excite *puerperal convulsions*, and cases have been cited to confirm this opinion. Experience, however, now shows that etherization is a valuable remedy for convulsions, and there is reason to believe that it is influential in preventing this dangerous accident, by moderating the mental and nervous excitements of the patient, and diminishing pain, which often operates as an exciting cause to eclampsia.

It has, also, been urged that the recovery of women, after parturition, is more *tedious*; and, that the nervous system particularly may be seriously deranged. Professor Simpson, however, takes the opposite ground, asserting that the bad effects of labor are less conspicuous, and the "getting up" is more favorable. There is reason to believe that no marked influence, in this respect, is exercised by anæsthesia; and, with the occasional exception of slight vertigo, confusion of ideas, and other nervous disturbances, the patients do well.

Nevertheless, some *caution* should be exercised in the administration of anæsthetic remedies; they should never be employed in very plethoric habits, or where there are evidences of congestions of the brain, heart, or lungs, or where there is any serious organic disease of these important organs.

Even when admissible, this exhibition should very seldom be carried to that of complete anæsthesia; in a large majority of cases, it is very valuable to quiet the mental and nervous agitations of the patient. The author has met with many instances, where slight inhalations of ether have exerted the most soothing influence upon the feelings and anxieties of the woman, and thus often prevented or moderated delirium, restlessness, irregular spasms, etc. Often a slight anæsthetic influence may be sufficient to moderate without destroying sensibility, so that labor progresses regularly, without any inordinate pain or disturbance. This is all that is necessary, except in a few, perhaps very few, obstetric operations.

The author, therefore, coincides in belief with those, who insist that the patient ought not to be entirely unconscious. The practitioner should have command of his patient, that he may direct what sensations are to be resisted, and what should be encouraged; when the bearing-down efforts are desirable, and when they should be remitted; and, of course, the woman should be in a condition to advertise her attendant as to the occurrence of any unusual pain, morbid sensation, etc. There are a few cases, of course, where complete anæsthesia may be essential.

Probably a large majority of practitioners will refuse etherization in "natural labors." Dr. Scanzoni objects to its exhibition in pelvic cases, as it might retard labor too long, with safety to the child. Dr. Condie says, "the disposition to restrict its administration to cases of complicated labor is greater than formerly." M. Cazeaux affirms that he is more and more convinced that it should be confined to cases of operative midwifery, or where there is some serious complication.

We have, therefore, specified the peculiar cases to which anæsthesia seems applicable, when treating of the varieties of dystocia.

Respecting *the infant* no bad consequences result, when the mother is etherized. Mr. Gream says that the pulsations of the foetal heart are augmented, but this is denied by Siebold, Dubois, etc. The indirect advantages to the child are often of the utmost importance. It escapes many of those dangerous consequences which follow the inordinate contractions of the uterus, and its life may often be preserved by obstetric operations executed during the anæsthetic condition of the parent, which might otherwise have been impracticable.

In connection with this subject, it may be remarked, that the nurse and other attendants should be careful not to expose the infant to an atmosphere loaded with the vapor of ether or chloroform. It may be prudent, also, not to apply the child too early to the breast after

etherization. Scanzoni mentions a case, where an infant, nursed under these circumstances, and after sleeping for eight hours consecutively, woke up in a state of great excitement, which continued for two days. M. Chassaignac relates an analogous case.

After a candid examination of various facts and arguments presented by scientific and experienced accoucheurs, the author believes that the conclusions above stated approximate so near to the truth, that they may be regarded as safe practical rules, not, however, to be carried out indiscriminately, but under the exercise of the cautious judgment of a well-instructed practitioner. Anæsthesia, as a general rule, should not be employed in normal labors, but be reserved for complications more or less serious, including many depending upon the mental and moral, as well as the physical condition of the parturient woman. While most practitioners sanction the above views, there are many who still protest against the employment of these measures. Dr. Ramsbotham, junior, of London, Dr. Robert Johns, of the Dublin Hospital, and Professor Meigs, of Philadelphia, have uttered very strong protests against anæsthesia in labor, declaring that it is fraught with danger, and predicting that, in the course of a few years, it will be banished from practice, except in a few extraordinary cases.

As regards *the mode of administration* of chloroform, some twenty or thirty minims may be dropped on the central portion of a folded handkerchief, which may be held near the mouth and nostrils, so as to allow atmospheric air to be mingled with the vapor.

Ether is used more freely. Two to three drachms may be poured upon a concave surface of a sponge, and applied directly over the nostrils and mouth; the ether should be frequently replenished, until the desired influence is acquired. Usually, in cases of labor, inhalation should occasionally be intermitted, or sometimes it may be continuously employed in moderate quantities.

As to the *time* of administration in labor, it should be given on the accession of "pain," and omitted during the intervals. This is decidedly the best plan in all ordinary cases; but we have found, where there is much mental excitement and agitation, it is best to commence the inhalation before the accession of pain, and often to remit during the contractions of the uterus.

When complete anæsthesia is demanded, inhalation should commence at the expiration of a "pain," and be continuously employed, as in ordinary surgical operations. This, however, in the opinion of the author, would be very rarely required; perhaps it ought to be restricted to the operations of version, symphyseotomy,

and the Cæsarean section. In other instances, as has been mentioned, the practitioner ought to preserve the consciousness of the patient, so as to maintain command over her voluntary powers during the process of labor.

The *local employment of narcotic remedies* in cases of rigidity is often very efficient. All are familiar with the beneficial effects of opiate enemata or suppositories. These may be, also, advantageously employed to the vagina, although here their beneficial effects are far less decided. More advantage is obtained by applying ointments of opium, morphia, etc., with slight friction to the os and cervix uteri.

The belladonna ointment has been strongly recommended as superior to any other narcotic, when applied to the os uteri. Its effects are stated by MM. Chailly, Velpeau, and many others, to be very rapid, complete dilatation occurring in eight or ten minutes. Drs. Meigs, Bedford and Keating, of this country, have found it very useful. M. Cazeaux declares that in common cases of rigidity it has no effect, but it is useful in cases of spasms of the internal or external os. Dr. Ramsbotham, Jr., has very little confidence in its powers, and this opinion is corroborated by many practitioners. The author's experience is not favorable. Some have considered it dangerous, fearing that its poisonous influences might disturb the mother, and also the infant. Caution, therefore, is necessary in its use, and the body of the child should be very carefully cleansed immediately after delivery, where this ointment has been used.

Carbonic acid gas, which by some has been found useful when thrown into the vagina, in cases of irritable uterus, has also been tried in cases of rigidity, but with no marked success.

Chloroform has been employed by Professor Simpson in the form of vapor, and also as an ointment. In this way it diminishes sensibility, promotes secretion, and causes relaxation. The ointment is prepared by adding a few drops of chloroform to butter, lard, or some simple ointment. The oil or "butter of cocoa," now so much employed for suppositories, will prove a useful vehicle for chloroform.

Mechanical measures to favor the dilatation of the os uteri and of the perineum have not been neglected. As regards the os uteri during the early periods of dilatation, all prudent practitioners condemn the use of the finger, bougies, or other measures to accelerate the process; and though such operations may be performed with impunity in many instances, yet they excite pain, irritation, and often spasmodic contraction in the os uteri, thus frequently retarding instead of accelerating the progress of labor. There is danger also of exciting

inflammation, and even of causing laceration of the tissues. These observations apply to rigidity of the os uteri, but they are, of course, not so applicable to cases of normal labor. Here, however, they should be carefully avoided, except in some extraordinary cases where it will be necessary to bring on premature labor, or where the life of the patient and that of her infant will be jeopardized by the continued resistance of an undilated os uteri. In such cases the plan suggested, and which has been very strongly recommended by Mr. Barnes, of London, of causing dilatation of the cervix by means of a small cylindrical bag of gum caoutchouc is the safest. The reader is referred to the chapter on the Induction of Premature Labor for more details on this subject.

After, however, the os uteri is nearly dilated, some gentle assistance with the finger is often found advantageous. Thus, where there is a displacement of the os, so that the child's head is directed against the anterior part of the cervix uteri, it will be found advantageous, not merely to place the woman upon her back, and by a hand externally applied to direct the fundus backward, but also to introduce a finger into the os uteri, and to make gentle traction efforts on its anterior margin. By these measures the orifice of the uterus may be brought into its proper position, parallel to the coccygeal plane of the pelvis.

In those cases, also, where the os is nearly dilated, but where the anterior margin strongly embraces the extremity of the occiput, and where it refuses to yield under the ordinary treatment, tractions upon its margin have often a good effect, and may be safely employed by the prudent practitioner. We have found it often sufficient merely to insert the finger over the parietal or occipital protuberances, to effect the liberation of the head. The high authority of Dewees, Churchill, Cazeaux, etc., may be cited as countenancing such mechanical assistance. Where labor has been delayed and where the rigidity is not great, the author has found similar advantage to result from the use of the lever, which occupies little space, and from its form facilitates the retraction of the os uteri over the head of the child.

Incisions of the cervix and os uteri have also been employed where labor is protracted and the above measures have not succeeded, and where it is to be apprehended that laceration of the os or cervix uteri, or that inflammation and gangrene may ensue. Facts have already been stated to show that such accidents may occur; whether these may arise from simple rigidity, where there is no mechanical resistance from induration or other lesions, may perhaps be doubtful. The author, after more than forty years' experience, has

never found it necessary to use the knife in cases of "vital rigidity." The experience of others seems to have been different, and certainly in the severe cases indicated, the operation should be performed rather than expose the patient to unnecessary danger. The best mode is to introduce a blunt-pointed bistoury, whose cutting edge is short, within the cervix, and to make superficial incisions on the lateral, the posterior, and even upon the anterior portions, in the direction of the length of the cervix. Several incisions are considered preferable to one. The effect has generally been, very rapidly to liberate the head; and no bad consequences have usually resulted. Still, however, there is danger from hemorrhage, but more especially from rupture of the uterus, extending from the incision. A minor objection may also be urged, that the cicatrices resulting, may render the dilatation of the os still more difficult in subsequent labors.

Rigidity of the Perineum will be very universally overcome by relaxing measures and by the pressure of the child. Sometimes, these are hardly adequate. A little increased pressure by the finger, therefore, especially during the absence of a pain, may sometimes be useful; but if there be great danger of laceration, incisions are here also advised by many experienced practitioners. They should be made not toward the central portion of the perineum, but upon either side, and the greatest caution should be exercised to prevent extensive rupture during the passage of the infant. Incisions, under these circumstances, are seldom however to be justified.

The *forceps* have been occasionally recommended; but much more generally condemned, in cases of rigid perineum, as tending to increase rather than diminish the danger of laceration. Certainly, there has been too much reason for prohibiting the forceps, arising from a mal-construction of the instrument, from its untimely employment, and the unskilfulness and rashness of the operator. Much mischief has been done, not merely to the perineum, but to the rectum, the urethra, the bladder, and even the os uteri, involving the life of the woman and her child. Nevertheless, should the labor be protracted, the child's life be in danger, and the bearing-down efforts of the mother begin to fail, there can be no valid objection to the use of the forceps by the prudent accoucheur. By them, labor will be very much shortened, to the great advantage of the mother and the child; and judging from his own experience in the use of the forceps, the author believes that the danger of rupturing the perineum is really diminished; certainly the danger is far less than when incisions are made. M. Cazeaux observes, that it is surprising, in many very protracted

cases, to find how easily and rapidly labor will be thus terminated, which may be owing, he says, to the forceps facilitating the extension of the head, which had been prevented.

The forceps are far safer, also, than the practice too often adopted of *stimulating the bearing-down efforts* of the mother, where there is still resistance at the floor of the pelvis; the direction^s, therefore, that the woman should walk about, that friction should be made over the abdomen, that stimulating drinks should be administered, and especially that the ergot should be given to augment the failing efforts of the uterus, are highly objectionable. The expulsive power may be augmented, but the resistance is not moderated by these measures; the child is compressed between two forces, and very often perishes, while the tissues of the parent may be severely and extensively lacerated. All these dangers are almost entirely obviated by the forceps, the action of which may be controlled with the utmost precision by the hand of the operator, who can regulate the degree of force required, and the rapidity of the delivery, so that no undue or sudden pressure is made upon the perineum, while the orifice of the vagina dilates regularly under the wedge-like influence of the forceps and the head of the child.

In the management, therefore, of labors, complicated with inordinate excitement, much may be done *in the early stages* by diminishing nervous and vascular excitement, not merely by removing all sources of irritation, but by the judicious resort to evacuating and narcotic remedies. Hence, during the first stage of labor, free venesection is often advantageous, followed by a dose of opium, quieting inordinate pain or spasmodic contractions of the uterus. Should etherization be preferred to opium, where the sufferings of the patient are great, we perceive no reason why it may not be employed before the os uteri is dilated, instead of restricting it to the second stage of labor, as has been recommended. It is not, of course, to be carried to complete insensibility, but simply to moderate mental and nervous excitement, and to relieve inordinate suffering.

These measures should be assisted by various local applications already detailed. The practitioner, however, should avoid frequent "touching," and be especially careful that he does not rupture the membranes. He should exhort the patient to avoid, as much as possible, all bearing-down efforts; as such efforts will do no good. On the contrary, they increase the irritation and contraction of the circular fibres of the uterus, and, in many instances, may cause premature evacuation of the liquor amnii. This accident is very unfortunate, as the tonic and expulsive contractions of the uterus will be

greatly aggravated, the rigidity of the os uteri will be often augmented, while the infant, which previously was comparatively safe, is now compressed between the contractions of the body of the uterus and the undilated cervix; the placental functions are soon disturbed, and not unfrequently suspended, causing the asphyxia or the death of the infant.

In those cases where infiltrations or bloody tumors are formed in the tissues of the cervix, it is not always necessary to interfere; the os usually dilates, and as its edges glide up over the child's head, the swellings form no impediment to delivery, and very soon disappear. If, however, they be large, either preventing complete dilatation of the os or the progress of the head, they should be punctured, or even incised; great care being taken not to injure the bladder or any other important tissue.

During the process of descent, after the head has passed the os uteri, there is often great delay, especially in primiparous women, demanding the exercise of great patience and forbearance, both on the part of the patient and practitioner. Much may be done with the relaxing and narcotic measures already detailed; yet in all cases much judgment is to be exercised, no violence should be offered, and the natural processes should be facilitated as far as practicable. It is only when the tissues are disposed to yield, or when the uterine powers begin to fail, that instrumental assistance should be rendered; even when this becomes necessary, delivery should be conducted slowly and carefully, time being given for the gradual yielding of the distended tissues, so as to prevent any contusion or laceration.

In such cases, the young practitioner should be cautioned as to the great importance of suitable support to the perineum, while, at the same time, he facilitates or, occasionally, opposes the extension of the head, as circumstances may demand.

During the fourth period of descent, the agonies of the woman are extreme; she becomes restless, impatient, and often makes violent and sudden bearing-down efforts, rendering the duties of the practitioner exceedingly arduous, and enhancing the danger of laceration. Under these critical circumstances, he should forbid all violent exertion, calm the mind and feelings of his patient by the assurance that her sufferings will soon terminate, while, at the same time, he should not abandon, for one instant, attention to the distended perineum; for, at any moment, laceration, or even perforation, might ensue.

Even *after the head is liberated*, and thus immense relief afforded, still, there is danger to the perineum from the passage of the shoulders and body of the

child, demanding the continuation of the perineal pressure, and that a proper direction may be given to the body of the child.

It has been mentioned that, in a few instances, the progress of the head, at the floor of the pelvis, may be impeded by watery or bloody effusions, and sometimes by the formation of sanguineous tumors. The continued pressure of the head may often cause the dissipation of these swellings; but, if any great impediment be presented, punctures through the skin or incisions into the tumor may be safely made.

IRREGULAR CONTRACTIONS OF THE UTERINE FIBRES.—This complication is not essentially different from that just considered. Spasms may exist, as already mentioned, at the external os uteri, also at the internal os, and in various parts of the body of the uterus.

During the Second Stage of Labor.—*Spasms of the external os uteri*, as they are ordinarily manifested, have been already considered under the head of Rigidity. But, in a few rare cases, after the head has passed the orifice, a spasmodic action occurs in the os uteri, which is then drawn around the neck of the child, so that the progress of labor is arrested, until a new dilatation of the os can be effected. Baudelocque, Dewees, Cazeaux, and others, record cases of this kind. Each of the former, however, in their very extensive practice, met with but one instance. Indeed, it is difficult to conceive how such an accident should occur, inasmuch that, when the os uteri glides over the head of the child in a state of flexion, its margin must pass directly to the thorax, as the chin extends to the sternum; and, moreover, if the neck should be embraced, the mobility of the shoulders is so great, that any serious delay could hardly be anticipated.

Should, however, this complication be met with, the head is found in the vagina, and although driven down, it is retracted during the intervals. The practitioner may pass his finger to the neck, and ascertain the contraction of the cervix. If, therefore, there be no other impediment to delivery, he may fairly presume that the delay is owing to such spasm around the neck of the child. The consequences may be serious; first, to the child, from the delay, especially if the umbilical cord should be unfortunately entwined around its neck: the sufferings of the parent are protracted, and much nervousness or even fever may result.

No resort should, in the first instance, be made to artificial delivery. The spasm must be previously relaxed by appropriate measures. Nothing, says Dr. Dewees, is comparable to free bleeding, even to faintness. If this be inefficient or inadvisable, dependence

must be placed on other evacuants, but also on the use of narcotics and anæsthetics, under the restrictions already mentioned.

As soon as the spasm yields, delivery may rapidly occur. Should this not be the case, the prudent practitioner would immediately resort to the forceps, for fear of the recurrence of the spasm, and the consequent arrest of the shoulders.

Irregular Contractions of the Internal Os Uteri, according to the report of authors—especially Dr. Dewees—are far more frequent, and constitutes a common obstacle to the operation of version. Their immediate cause is obscure; but it is referred, by Dr. Dewees, to the natural disposition of every portion of the uterus to contract after delivery, which disposition, in this case, is prematurely and too powerfully manifested. M. Cazeaux affirms, also, that it never occurs unless the waters have been long drained off.

The *symptoms* are analogous to those of spasm of the external os uteri. The patient suffers much pain, and strong bearing-down efforts, by which the head approximates the perineum, are followed by its retrocession, no relative change taking place between the child and the uterus, which may now be regarded as one mass. On examination per vaginam, the external os will be found dilated, forming no obstruction. If a finger be passed over the head, a stricture will be found embracing the neck of the child, explaining the cause of the delay.

The *treatment* should be the same as that just detailed. Dr. Dewees speaks, in the highest terms, of venesection *ad deliquium animi*: nothing short of this, he thinks, would be advantageous. Certainly, it is the most efficient remedy, and should be employed, unless there should be some contraindication. The life of the child and the welfare of the parent are alike involved.

Opiates and anæsthetics come in as accessories, or as substitutes; but they do not manifest, in most instances, powers equal to the loss of blood.

As soon as the spasm has relaxed, version has been recommended. This, certainly, must be bad practice. There will be no certainty that the spasm would not recur, even so soon as to prevent or arrest the operation. But, even if mutation be accomplished, the greatest danger would still exist. The spasm might return so as to arrest the body or head of the infant, with fatal results, from pressure, then unavoidably made upon the umbilical cord; while the danger and suffering to the mother would be enhanced.

The *forceps*, therefore, should be employed instead of version. This would insure the passage of the shoulders below the internal orifice, and prevent any further delay.

Spasms of the Body of the Uterus have been termed, by Baudelocque, "irregular contractions of the uterus." They are generally observed during the second stage of labor. The patient complains of severe pains, but insists that they "do no good." The bearing-down efforts are partially or completely suspended; the woman becomes restless, nervous, and anxious; not unfrequently, there is much vascular excitement; the pulse becomes full, the skin dry, the face flushed, etc. On examination per vaginam, the head is found stationary, or advances but slowly. If it be the first stage of labor, the os does not dilate. If an external examination be made, the uterus will be found irregular in its form; some portions of it hard and contracted, others are less firm, perhaps projecting more than usual.

Sometimes these irregular contractions are perceived at the fundus of the uterus, occasionally at one of its angles, sometimes toward the lower portion of the body of the organ. Labor, of course, is arrested, and the nervous and vascular symptoms may become serious. Such irregular contractions are not unfrequently temporary, but occasionally last for one or more hours.

The *causes* are various, often depending upon mental or moral disturbances, occasionally upon excitement or congestion of the blood-vessels, still more frequently upon irritations of the stomach and bowels, when especially from the collection of gaseous and feculent matters.

In the *treatment*, therefore, all such causes, whether original or aggravating, should receive prompt attention. Much good may often be effected by large laxative enemata. If the patient be plethoric, or the pulse full and strong, bleeding will contribute greatly to her comfort; it should be followed by a full dose of laudanum, best administered per rectum. This quiets the local and general excitements, often produces sleep, which will be succeeded by a return of the natural contractions of the uterus. In some cases, etherization may be substituted for the opiate. It is very seldom requisite, in these irregular contractions of the uterus, to resort to artificial delivery; which should be avoided, unless under peculiar circumstances.

During Third Stage of Labor.—This stage may also be complicated by the existence of irregular or spasmodic contractions. Nature's mode of delivering the placenta has already been noticed, and also the treatment of the third stage of normal labor. The *placenta* is, however, occasionally *retained* for an inordinate time after the birth of the child. The causes are various; some trifling, and others more or less dangerous. It often happens, even in natural labors, that the uterus remains quiescent for one or more

hours; there is no pain and no hemorrhage. In such cases, the pressure of the hand upon the uterus may insure the tonic, or even expulsive contractions. If these be not adequate, and all other circumstances favorable, it is best to deliver the placenta, as there is danger, so long as it be retained, of irregular contractions or spasms, of severe pain, and, above all, of the occurrence of hemorrhage. It is a good rule, therefore, never to leave the patient until the after-birth is completely removed.

If, therefore, on examination per vaginam, the placenta be found to be in utero, the cord being traced up to the orifice, and if the tonic contractions of the uterus be complete, and no hemorrhage be present, half an hour or an hour after delivery, traction may be made moderately on the umbilical cord to facilitate the descent of the placenta.

That this operation may be effectual, the practitioner should, by external pressure, direct the fundus of the uterus forward toward the linea alba, so that the axis of this organ should be coincident with that of the superior strait. Inattention to this rule is one reason why practitioners have failed in their attempts. An assistant should place one or more hands on the uterus, so as to retain it in position, and to depress the whole organ; at the same time, the practitioner should introduce the index finger into the vagina, to the centre of the pelvis, and then bend it transversely in front of the umbilical cord, while, with his left hand, sometimes covered with a cloth, he embraces the external portion of the cord, so as to make traction over the finger placed in the vagina. This finger now operates as a pulley, over which the cord is drawn, and the practitioner is thus enabled to make traction effort perpendicularly to the plane of the orifice of the uterus; this is a great mechanical advantage, instead of pulling the cord obliquely against the edges of the orifice. We prefer using the index finger, in the manner mentioned, instead of, as is usually directed, passing two or three fingers toward the os uteri, and making a pulley over their extremities; for we have found the smooth and polished surface of the cord is apt to glide from the fingers, or to slip between them.

Traction thus made acts in unison with the contractions of the uterus and with the external pressure made by the assistant, and is generally very efficient; care must be taken to use a moderate, but steady force, so as not to tear the umbilical cord or its attachments to the placenta. When the after-birth has descended into the vagina, the patient should be requested to bear down, while the practitioner continues the traction upon the cord, with the left hand, and at the same time directing the index finger of the right as a hook

over the placenta, he causes its descent over the posterior wall of the vagina.

There are cases where the *placenta is retained*, and such moderate measures will be inadequate for its expulsion. Statistics seem to indicate that retention of the placenta is not common, especially with experienced practitioners. It is stated as occurring once in two hundred, or even three hundred cases. This can only be regarded as an approximation to the truth. The causes of detention being numerous, at present, we shall notice those only which depend upon an inordinate or irregular excitement of the muscular fibres of the uterus; and,

First. *Spasm of the External Os Uteri*.—This sometimes is trifling, but occasionally it is decided, depending upon a preternatural irritability of the uterine tissue. The exciting causes are not usually evident; they may depend, as in other similar cases, upon the mental or moral condition of the patient, or upon sympathetic irritations of the stomach, bowels, etc. We agree with Dr. Meigs in considering the influence of *ergot* as the most common of these causes. This spasm of the external os uteri is, however, a rare accident, and sometimes more apparent than real. Hence we find that, although upon examination the *os uteri seems to be small*, yet it readily yields to contractions of the body of the uterus, or to slight pressure from the placenta when traction is made upon the cord. Moreover, the delay is sometimes owing, not simply to the small size of the orifice, but to the *large volume of the placenta*. This body, even in single births, is sometimes very voluminous. Its size is occasionally augmented by great turgescence of the umbilical vessels, also by serous or bloody effusions; this has often been called an apoplectic condition of the placenta. In compound pregnancy there may be two, three, or more placentæ united, though occasionally in twins and triplets the placentæ are separated. In some instances, also, quantities of coagulated blood collect above the placenta, thus apparently increasing its size. In most of these cases, by stimulating the contractions of the uterus, and by making traction on the cord, the difficulty will be removed. When the umbilical vessels are engorged, the ligature should be removed, that this congestion may be relieved; or, if necessary, the hand being previously introduced into the vagina, the index finger should be carried into the uterus, and directed to the edge of the placenta, and thus cause its descent "edgewise," when all difficulty will be dissipated, as this body is soft and compressible. Any coagulated blood, which may have been collected above the placenta, will, during the above operation, readily escape.

In a few cases, however, a true *spasm* of the os uteri externum will be perceived: the symptoms vary much in different cases; in some, the uterus has its regular tonic contraction, there is little or no pain and no hemorrhage, and the patient is comfortable, excepting there remains some mental anxiety, because the after-birth is retained. Many instances are upon record, where this state of things has lasted for several days, without any bad consequences; indeed, the high authority of M. Nægèle, and other distinguished accoucheurs, has been called to support the opinion, that the placenta has, in some few instances, been "absorbed." M. Nægèle's patient was carefully watched, and no evidence was presented that any portions of the mass ever came away, or even that putrefaction had ensued. Such a termination must be very rare, and cannot form the foundation for any practical rule.

Usually, when the placenta is retained, under these circumstances, after a few hours or days, the spasm relaxes, and the tonic or active contractions of the uterus cause its descent and expulsion. Should it, however, be still longer retained, there is often hemorrhage: but, still more frequently, the placenta becomes putrid; fetid exhalations and acrid discharges occur per vaginam; the woman becomes feverish, weak, and may sink into a low typhoid condition, which may prove fatal from the absorption of putrid matters.

In other cases of retained placenta, the uterus does not remain quiescent; not only tonic, but alternate contractions ensue, the whole organ becomes rigid, and the placenta is said to be "encased." The woman suffers severely from these ineffectual contractions of the uterus, disturbing her nervous system for hours, or even days after delivery; in some instances, producing prostration, collapse, and death. The author witnessed a case of this kind in a young woman, in her first labor, where ergot had been unfortunately administered. A fatal termination is, however, rare; the powers of the uterus become more feeble, the os uteri yields, either before or after putrefaction has ensued, and the patient may recover.

Second. *Spasm of the Internal Os Uteri*.—The same series of phenomena may exist from spasm of the internal os uteri, which often involves the whole of the cervix, the placenta being "encased" within the cavity of the body of the uterus.

The *treatment* of these two varieties of retained placenta demands the exercise of much judgment and discretion.

In the *first variety*, where the uterus is quiescent, high authority may be quoted for the non-interference of the practitioner; nature, it is said, will be fully adequate to accomplish a safe delivery. The experience

of Dr. William Hunter, who advised this negative practice, was decidedly unfortunate; several of his patients perishing. Many accoucheurs, however, still recommend to wait for several hours, and even for a day or two before making any attempt to deliver; while others, dreading retention and the consequences of the mental anxiety of the patient, insist that the practitioner should not leave his patient until delivery be accomplished. This latter, we think, a good rule; there is no necessity, however, of haste. The patient should be made comfortable by removing all wet and soiled garments, by receiving a little nourishment, and, occasionally, some stimulus; very generally an anodyne enema will prove very useful, by quieting mental and nervous excitement, and promoting relaxation of the os uteri. In the course of an hour or two, if there be no active contractions of the uterus, gentle frictions and pressure may be made over the fundus, and very slight tractions in a proper direction may be made upon the cord. If the placenta does not descend, the whole hand of the practitioner may be introduced into the vagina, and a gentle attempt, by one or more fingers, be made to dilate the os uteri, and reach the placenta; no force, however, should be employed. This failing, dilatation of the vagina and os will be successfully accomplished by the caoutchouc bag passed into the os uteri, as proposed by Mr. Barnes; or, if there be no tendency to hemorrhage, large and warm vaginal injections may be useful.

These and similar measures being unavailing, instruments may be safely employed. The most convenient, and perhaps effectual, is a small blunt hook; (Plate XIV., Fig. 71;) this can be readily passed, and so directed that the extremity of the hook should not be pressed against the uterine walls, but against the placenta, which may thus be drawn down partially or completely into the vagina. Placental forceps may, also, be employed. They are generally long and narrow, resembling forceps for the removal of polypi. The one generally used in this city was designed by the late Dr. Bond. The chief difficulty in their use is that the contraction of the os uteri prevents their being sufficiently opened in the uterus to grasp the placenta. This objection does not apply to the kind exhibited in Plate XV., Figs. 85 and 86. In this forceps the blades revolve upon each other; they may thus be brought together, so that the convexity of the one corresponds to the concavity of the other, and the instrument has the appearance of a long, narrow lever or vectis, in which state it can be easily introduced through a contracted os into the cavity of the uterus, between the placenta and the internal wall. Then, by a mandrel attached to the lower portion of the instrument, the blades can be

made to revolve, so as to assume the ordinary character of a forceps, a spring attached to the handles con-

Fig. 100.



Bond's Placental Forceps.

tributing to the separation of the blades, which now may embrace the placenta. The ingenious mechanism of this instrument was devised by Dr. Charles B. Everett, a graduate of the University, and applied to the construction of a "bullet-forceps." By enlarging the size of the instrument, we have found it valuable in removing the placenta.

A long narrow vectis might also be advantageously employed.

If these instruments be judiciously used, we can perceive no objection to their employment, after the ordinary remedies for promoting relaxation have been exhibited.

Rupture of the Cord, from too forcible traction or from its putrefying condition, is occasionally met with. This, however, does not seriously complicate the case, although no traction effort can then be made, yet the experienced practitioner can easily hook down the placenta after his hand has been introduced into the vagina, or some of the other measures recommended may be readily adopted.

The placenta may be distinguished from the uterus by the comparative softness of its texture and by its want of sensibility; and from coagulated blood, by the fibrous character of its tissue, as well as by its greater

comparative size. It occasionally happens that only portions of the placenta are removed, or that part of the membranes remain in utero. These may sometimes be withdrawn by means of the finger or forceps, or the bad effects of retention be counteracted by uterine injections.

In the treatment of the *second variety* no artificial attempt should be made to remove the placenta; but all the efforts of the practitioner should be directed to diminish the pain and spasms of the uterus and to promote relaxation. Such measures need not now be repeated. It may be observed, however, that venesection is often important, and that in addition to the usual narcotics anæsthesia may prove exceedingly valuable, not only in relieving suffering but in promoting a degree of relaxation requisite for the extraction of the placenta.

Many practitioners place great confidence in the local application of narcotics, especially the belladonna ointment. M. Stoltz details a case where the placenta was encephalated after the exhibition of ergot. After he had given some Hoffman's anodyne and opium without any perceptible effect, at the expiration of several hours he injected into the uterus a decoction of belladonna and hyoscyamus, repeating the operation every half-hour. After a few injections a portion of the placenta appeared at the os, when the whole mass was gradually delivered by traction on the cord twelve hours after the birth of the child.

In those cases where putrefaction has taken place, it becomes still more important to facilitate the discharge of the placenta. This may occasionally be done in the manner already directed. Should this be impossible from the softened condition of the putrescent mass, injections of warm water or mucilages, carefully strained, should be thrown into the cavity of the uterus three or four times a day, to wash away the fluids and the fragments of the placenta, while the strength of the patient is supported by nutritious diet, tonics, and stimulants.

Third. *Irregular contractions of the body of the uterus* may cause retention of the placenta.

These contractions are often partial: thus the whole body of the uterus may contract regularly, except one horn, in which the placenta may be retained. More frequently, however, portions of the uterus contract feebly, while the circular fibres in some parts are thrown into spasmodic action. Thus, it happens that the fundus of the uterus may be inert, and also the lower portion; but a spasmodic stricture may exist about the middle of the organ, thus dividing the uterus into two cavities, one superior and the other inferior. This has been termed the "hour-glass con-

traction," the placenta being found in the upper cavity, and is said to be "encysted."

Fig. 101.



Hour-glass Contraction of the Uterus.

Under this expression some authors include the spasmodic contraction of the internal os uteri, which has already been mentioned. M. Levret mentions a singular case where the midwife made improper traction upon the cord, causing a spasm of the internal os uteri, and also of the circular fibres of the body of the uterus—thus dividing the organ into three portions, the placenta being retained in the superior one. The hour-glass contraction of the body of the uterus is a rare accident, and generally presupposes a state of inertia, spasms supervening from some accidental cause.

The exciting *causes* are very obscure, some referring it to the natural disposition of the uterus to contract after delivery, or to injudicious and premature efforts to remove the placenta, especially by traction upon the cord; others to states of the mind or to sympathetic irritations from other organs.

The *symptoms* are not doubtful: the patient generally complains of some pain without any disposition to "bear down;" the practitioner, on an external examination, finds the uterus to be very narrow and quite elongated, the fundus being often above the umbilicus. Per vaginam, the umbilical cord can be traced readily through the cervix uteri, but no placenta can be felt, and there will be no evidence of its descent. Care should be taken, not to confound this stricture with spasmodic contraction of the external os uteri, mistaking the vagina, as has been done, for the lower part of the uterus. If the hand be introduced into the uterus, the stricture can be detected, embracing the cord, and occasionally also some portion of the placenta. There is seldom much hemorrhage, but if the inertia of the fundus of the uterus be considerable, there may be some bleeding. The patient is anxious, nervous, and

sometimes, where there is hemorrhage, weak and exhausted.

As to the *treatment*, practitioners differ in opinion; some intrust the case, where there is no great hemorrhage, to nature, contenting themselves with the exhibition of narcotics. Others pursue a more decided plan, recommending relaxing applications and a resort to ipecacuanha, tartar emetic, and even to the lancet, in some cases. Dr. Dewees, however, thinks nothing is to be gained by delay; and that bad consequences may be anticipated so long as the placenta remains. He counsels, therefore, its immediate delivery. We have followed this practice in a few cases which have come under our notice, and have no reason to regret the course pursued, which indeed becomes essential where hemorrhage exists. The exhibition of ergot, which would seem to be advisable, considering the inert state of the fundus, might prove injurious by increasing the spasm and by promoting the contraction of the lower cavity of the uterus.

The best plan, therefore, is to resort to anæsthesia or administer a full dose of laudanum, and immediately to attempt the extraction of the placenta. The woman should be placed on her back with the hips near to the edge of the bed, as in other obstetric operations, and the left hand of the operator should be placed over the fundus of the uterus, so as to depress it and facilitate its contractions. At the same time the right hand, well anointed, should be passed through the cervix into the lower cavity of the uterus, following the umbilical cord as a guide. On reaching the strictured portion, slow, gradual dilatation should be made with one or two fingers, until the placenta can be reached, at least with a finger, when it may be gradually hooked down, portion after portion, into the hand of the practitioner. As the mass is thus removed, the fundus contracts under the external pressure of the hand, and the uterus resumes the usual form presented after delivery.

M. Stoltz recommends that the hand of the practitioner should be anointed with belladonna ointment in order to facilitate the relaxation of the spasm; we should apprehend there might be danger that the woman might suffer from this free use of belladonna. Anæsthesia may sometimes be requisite where there is great nervousness or local sensibility, notwithstanding the inertia of part of the uterus.

Much may be done to *prevent* these hour-glass contractions by securing the regular contractions of the uterus before and after the birth of the child. Thus, after the head is born, the practitioner should not drag away the body of the infant, but should wait for another bearing-down pain. He ought, also, as soon as delivery of the child is accomplished, to make external

pressure and friction, so as to insure the tonic action of the womb, that all tendency to inertia may be obviated and the placenta be closely embraced.

Preternatural adhesions of the placenta to the internal surface of the uterus is another cause of the retention of that body. Such adhesions may be connected as the cause or effect of inordinate excitement of the organ, and therefore may be considered under this division of our subject.

The causes are obscure, no doubt often connected with the uterus, but sometimes with the placenta; the uterus is occasionally found altered in its texture, being thicker and harder, perhaps from inflammation; occasionally, says Dr. Ramsbotham, it is excited by falls, blows, etc. Sometimes there are other lesions in the walls of the uterus. In one case which occurred to the author, a small tumor could be felt on the external surface of the uterus, opposite to where the placenta was attached internally.

The placenta is sometimes discolored throughout its whole tissue, or in particular portions; it may be thickened, indurated, sometimes simply on the uterine surface, and occasionally through its whole thickness. In a few instances, calcareous deposits are found in its texture.

Some of these phenomena have been traced to inflammation, and the preternatural adhesion therefore has been considered analogous to that taking place from adhesive inflammation. This may be correct; but as M. Velpeau observes, mucous surfaces do not adhere when inflamed; there is increased secretion, but no adhesion. There can be no doubt, however, whatever may be the explanation, that very firm adhesions are occasionally found between the placenta and the uterus, sometimes over the whole uterine surface of the placenta, but more frequently in a small part. Hence we have partial or complete adhesions.

The consequences of these preternatural adhesions may be serious, being often followed by severe uterine contractions which may prostrate the powers of the patient, or by putrefaction of the placenta, with its usual deleterious effects, local and general. Not unfrequently the uterus may remain quiescent, and the patient apparently comfortable; indeed, there are many recorded cases where the placenta has been retained for weeks and even months, and that without any evidence of decomposition. This extraordinary result arises, says M. Cazeaux, from one or two causes; either from the drying up and absorption of the placenta, which may have possibly occurred, or what is more common, from the placenta retaining its vitality from its close connection with the uterus.

The *diagnosis* is not easy, and many mistakes there-

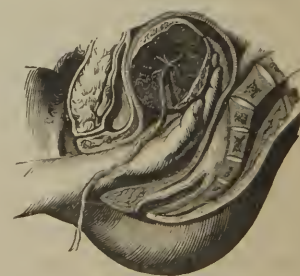
fore have been made, especially by the uneducated and the inexperienced. Such individuals, when the placenta is retained from any cause, are ready to exclaim, "it has grown to the side." Preternatural adhesions, however, are very rare, these supposed cases being relieved by proper attentions.

It may be presumed that adhesions exist when the uterus is large, firmly contracted, and the os uteri internum vel externum is sufficiently opened, and where suitable tractions upon the cord, assisted by external pressure, have failed to expel the placenta. There is seldom any hemorrhage, although occasionally there is bleeding, when only a portion of the placenta is adherent; and this bleeding may of course be profuse should there be an absence of the tonic contractions of the uterus.

The diagnosis may be confirmed by introducing the hand into the uterus, when the accoucheur can ascertain the cause of the retention.

Finding the placenta to be fixed, its removal should be attempted, first by a renewal of traction, not by pulling the cord in the direction of the axis of the uterus, which Levret and Baudelocque say, will be very ineffectual, unless the placenta is attached to the fundus of the uterus; but such traction should be made perpendicular to the placenta, by passing one or two fingers into the uterus to create a pulley, and thus give a proper direction to the force employed. This failing, the uterus may be stimulated to more powerful contractions, by introducing the hand and pressing firmly upon the placenta, while with the other hand steady pressure is made externally over the fundus uteri. If this be not adequate, the fingers of the practitioner should be carefully carried between the placenta and the internal surface of the uterus, the palmar surface of the fingers being toward the uterus. By a slow and cautious movement of the fingers the adhesions may be destroyed, and the placenta liberated. No force should be exer-

Fig. 102.



Removal of Adherent Placenta.

cised, and the greatest possible care taken not to injure the uterine tissue, as hemorrhage, rupture, or inflam-

mation may ensue, and prove fatal to the patient. Melancholy cases of this kind are upon record. Should, therefore, the adhesions be very close, the accoucheur should content himself with lacerating the placenta, and bringing away as much of the mass as possible; the case should then be left to the natural changes. Usually the remaining portions of the placenta will putrefy and be gradually discharged, leaving in some cases an ulcer on the surface of the uterus. The patient will be in a dangerous condition until all foetid discharges have ceased, and inflammatory symptoms disappeared.

These unpleasant consequences may be modified by mucilaginous, antiseptic, and occasionally astringent

washes, and by suitable attentions to the general system.

In all these manual operations for the removal of the placenta, much judgment is required as to the time of the operation, and also as to its performance. The uterus should be well supported by one hand externally, while the other is cautiously introduced into the cavity of the uterus, so as not to contuse or lacerate its tissues; and grasping the placenta, the fingers should be kept extended so that the hand should occupy as little space as possible. The placenta should be withdrawn slowly, and the tonic contractions of the uterus should be excited to prevent or arrest any tendency to hemorrhage.

CHAPTER XXII.

DYSTOCIA.—COMPLICATIONS FROM THE MOTHER.—PUERPERAL CONVULSIONS.—RUPTURE OF THE UTERUS.

AMONG the complications of labor from "inordinate excitement," few are more terrific and fatal than puerperal convulsions. The character and treatment of this affection have elicited the best efforts of the profession, and although much has been accomplished, yet still many points remain unsettled, and are the subject of constant investigation and serious discussion.

PUERPERAL CONVULSIONS.

As the name imports, they are peculiar to the puerperal state, occurring during gestation, parturition, and also after delivery, and are not to be observed under other circumstances. Although, therefore, closely allied to other convulsive affections to which women are liable at different periods of their existence, they are of a different type, peculiar in their symptoms and history, and demand important modifications for their treatment. From their resemblance to other similar complaints, authors have subdivided them into Hysteric, Epileptic, Cataleptic, Tetanic, and Apoplectic Convulsions, according as the symptoms simulate one or other of these varieties of spasmodic diseases.

Doubtless women are liable and occasionally do suffer from any of these forms of convulsions during the

parturient state; but, nevertheless, puerperal convulsions should be regarded as peculiar, as essentially different from any of these varieties, although the marks of distinction cannot always be clearly designated. These truths will be elucidated whilst studying the history of this affection.

Premonitory Symptoms.—These are occasionally well marked; but in a large majority of cases their duration is short, and the attack is sudden and unexpected. Frequently there is no premonition whatever, the patient becoming immediately insensible and convulsed. In most cases, however, she complains of the loss of sight, the "room becomes dark," she hears noises in her head, "tinnitus aurium," she complains of severe pain in some one point about the head, very often in the eyes, the temples, and not unfrequently on the top of the head. This pain is usually excessive, and indeed intolerable, being followed by a loss of consciousness and severe convulsions. Occasionally, the first sensation of pain is in the epigastric region, often preceded by symptoms of indigestion, when instantaneously the exclamation may be made, "Oh! my head!" In some instances these more severe symptoms are preceded by giddiness, vertigo, confusion of thought, loss of memory, and slight delirium.

In the milder and more hysteric forms of the disease there is mental agitation, sensations of oppression about the præcordia and chest, feelings of suffocation, "globus hystericus," soon followed by more decided convulsive symptoms. There is often coldness of the hands and feet, with flushings of the face. The pulse is usually more rapid and full, but, in the severer forms, hard and corded, especially in the strong and plethoric; but even in the weak and pallid woman, although the pulse is small and contracted, it is firm, and often hard.

These premonitory symptoms are observed much more frequently when the convulsion appears during pregnancy than during labor, or even after delivery.

Symptoms.—The patient quickly becomes insensible, no impression can be made upon the sensorium; the muscles of the face become terribly agitated, the eyes roll in their sockets, the corneæ being often concealed under the upper lids; the pupils are generally dilated, but sometimes contracted. The muscles of the neck are rigid, often turning the head to one side, but still convulsed. The same may be observed of all the muscles of the body and extremities; much tetanic rigidity, yet, nevertheless, convulsive agitations. The body is rather drawn back, the lower limbs straightened out, and the upper extremities tossed about. There is, therefore, no locomotion, the patient being fixed upon her back, thus differing from the more usual forms of hysteria. The mouth is generally open in the first instance, the tongue protruding, and apparently swollen; afterward the mouth is rigidly closed, so that the tongue is bitten, the blood often mingling with the salivary and mucous secretions of the mouth. Deglutition becomes impossible. During this frightful agitation of the whole body, the skin, but especially the lips, tongue, and face, become first pallid, and then livid; there is turgescence of the external jugular veins, and also convulsive throbbings of the carotid arteries. Under these circumstances, the face and neck are swollen, partly from venous congestion, and also from infiltrations of serum into the areolar tissue. The pulse is strong, slow, and resistant, the extremities are cold and bluish; the respiration, at first oppressed, becomes short and convulsive, accompanied with prolonged expiration; the air, mingled with the saliva of the mouth, produces a hissing noise, and there are frothy and bloody discharges from the mouth. If the fit be prolonged, respiration often becomes stertorous, intermittent, and sometimes even suspended, it may be, to a fatal extent. As the paroxysm continues, the pulse becomes more feeble, and can hardly be recognized at the wrist. It is said by some authors that there are involuntary discharges from the bladder and rectum.

Should the patient be in labor, the contractions of the uterus are occasionally suspended; more frequently they become feeble, intermittent, and irregular. Hence, the os uteri being partially open, the process of dilatation is nearly or quite arrested. So, also, if the head has escaped from the os uteri, its descent is greatly retarded. Sometimes, however, owing probably to the great relaxation of the tissues, the os uteri will be found enlarging insensibly, but, nevertheless, rapidly, even when there were no prior indications of labor. The child, also, is occasionally soon delivered when the head is low down, owing to the relaxation of the floor of the pelvis, although the uterine contractions are very feeble. It is worthy of remark that, although the patient is insensible to every other impression, yet, on the recurrence of contractions of the uterus, she moans, and makes a slight bearing-down effort. It is said, also, by most observers, that there is a disposition to a return of the convulsions produced by these uterine efforts; but certainly this is not always the case.

The continuance of these fits varies from one or two minutes to five, six, or even eight; they cease gradually, the spasms yielding; and deeper and more regular inspirations ensuing. The lividity of the countenance then diminishes, a brighter color appears, the skin becomes warmer, the pulse fuller and softer, and the patient gradually manifests some consciousness; yet still for a long time she is dull and bewildered. Sometimes, however, she becomes apparently conscious, answering and asking questions, and seems quite revived. In other instances, she remains very dull, insensible, and occasionally perfectly comatose. The paroxysm may not return; but far more frequently it reappears with greater or less severity, after varying intervals of a few minutes to several hours. In bad cases, however, the intervals are short, the convulsive agitations more tetanic, and the coma more profound; this is unfavorable, and may eventuate in death. When the intervals are longer, and marked by a return of consciousness, less danger is to be apprehended.

The *duration* of these convulsions varies exceedingly, depending upon their causes, their severity, treatment, etc. Often there are only one or two paroxysms; but generally they are more numerous, occurring after intervals of one or more hours, and sometimes almost continuously. We have known cases where they have lasted five or six hours, with very slight intermission, and yet the patients have recovered. As a general observation, they disappear when the cause is removed, provided no serious lesion of the brain or spinal marrow has occurred.

The *terminations*, therefore, are occasionally fatal. The frequency of this unfortunate result was formerly

in the proportion of one to two cases: but, under the influence of a more improved practice, this proportion is now stated to be but one in four; and, in our own practice, the mortality has been far less.

Recoveries are often very rapid; the spasmodic symptoms disappear, circulation and respiration become natural, the sensibilities and consciousness of the patient soon return, and the subsequent phenomena are similar to those after natural labor. We have not witnessed any predisposition to peritonitis or other inflammatory affections, as consequent upon puerperal convulsions. In some cases, however, the head remains disturbed, with a sensation of fulness, heaviness, or disposition to sleep; the patient complains of giddiness, cannot fix her attention, is incapable of prolonged thought, and, not unfrequently, has her memory much impaired. We have never known these symptoms of long duration; authors state that they are sometimes prolonged, and that mania, or even loss of mind, may be the result of these cerebral irritations. Happily, convalescence is generally complete, and there is seldom any disposition to the return of these affections even in subsequent confinements. To this last observation, however, there are many exceptions, arising from peculiar temperament, or from the neglect of proper prophylactic treatment.

It is interesting, in a psychological and practical point of view, to remark that, in almost every case of puerperal convulsions, there is a perfect oblivion of every circumstance from the commencement of the fit until the period of decided convalescence. This includes what are called the lucid intervals, during which the patient is conscious, converses rationally, and is apparently free from disease, yet afterward she has no recollection of any of these circumstances: one, two, three or more days are perfect blanks in her existence. She will not remember any of her sufferings, sensations, or mental operations, and not even the birth of the child. In one instance, a patient of the author, some three hours after the convulsion, and after the birth of her child, conversed freely, and seemed to be quite relieved. A little soup was presented to her, which did not suit her palate. She pushed it away, with the exclamation, "Pshaw! pshaw! Mutton! mutton!" but of this, and of every other event which transpired during three days, she had subsequently no reminiscence.

Examinations after death shed but a feeble light on the nature of puerperal convulsions. In a large number of cases, no lesion whatever can be discovered after careful investigation. In some, there is a manifest turgescence of the venous system, of the brain, and spinal marrow. In a smaller number of cases, serous

effusions will be found on the surface of the brain, especially toward its base and in the spinal canal. They are, also, occasionally to be found in the ventricles, to the extent of six, eight, or more drachms. In a few instances, blood is effused on the surface, in the substance, or into the cavities of the brain. M. Cazaux with others believe that albuminous nephritis is the most common lesion to be found in these cases; and that such lesion, if not visible to the naked eye, may, nevertheless, be detected by the microscope. MM. Blot and Depaul, with other observers, declare that there is no necessary connection between these complaints; that, although Bright's disease may sometimes be coexistent with convulsions, yet they have met with no such example in post-mortem examinations.

The *causes of puerperal convulsions* may very advantageously be divided into the two general heads of *Predisposing* and *Exciting*: the latter are generally very evident, but the former must be regarded as obscure, since great discrepancy of opinion has existed, and still continues, among the learned and experienced of the profession. Practically, however, this discrepancy is, in many instances, more apparent than real; and, perhaps, much difficulty has arisen from the over anxiety of pathologists to understand and explain what is essentially mysterious and inexplicable.

Predisposing Causes.—The author has long been of the opinion that these essentially depend on the *increased excitability* of the nervous system generated by pregnancy. The evidences of this excitability, both as regards the mind and body, have already been detailed in the chapter on the Symptoms of Pregnancy. This augmented "sensitiveness," as it is termed by Drs. Churchill and Ramsbotham, Jr., is very universally acknowledged, and is usually observed, in various degrees, from the time of fecundation, through the whole process of gestation, and even for weeks and months after delivery. Hence, every pregnant woman has her mental, moral, and physical being more readily disturbed during pregnancy than under any other circumstances. She is more liable to neuralgia in all its forms, to spasms, cramps, cephalalgia, etc., than before fecundation had taken place. If, therefore, any powerful impression be made upon her nervous system, by moral or physical causes, there will be a proportionate disturbance of its functions—as the excitability is great, the disturbance will be great. The irritability, therefore, of the nervous system, characteristic of pregnancy, is the essential predisposing cause of puerperal convulsions, as well as of other nervous affections. In this respect, the sensitive system of woman, during gestation, is very analogous to that of the young child. It

is well known that convulsions may be excited in the most healthy infants from causes comparatively trivial; a sudden noise, a slight indigestion, the presence of bile in the stomach, or of worms in the intestines, will often produce convulsions in an infant, while they would be comparatively innocuous in a child or an adult.

This susceptibility of the nervous system is not, however, the sole cause of the frequency, and especially of the fatality of puerperal convulsions. *Plethora*, or the excited condition of the blood-vessels is also a very important predisposing cause. We have endeavored to demonstrate that, in all cases of pregnancy, there is a natural tendency to plethora, and often to increased vascular excitement. Hence, under the ever varying condition of the nervous system from internal or external agencies, there may be local congestion, proportionate to the degree of irritation or the plethora which may exist. Such congestion not only aggravates the nervous irritation, but interferes with the functions of the organ, and may be followed by watery or bloody effusion, augmenting, to a still greater degree, such functional disturbances. Should the brain, therefore, be the seat of irritation from a moral cause, followed by congestion, and especially by sanguineous effusions, the cerebral functions will be deranged, as manifested by pain, delirium, convulsions, coma, and, it may be, by death.

The simple declaration, therefore, is that the natural exaltation of the nervous and vascular systems, and the disposition to plethora, constitute the predisposing causes of puerperal convulsions. This predisposition is, therefore, created by and dependent upon the presence of a living child in the uterus, the "action of gestation." The predisposition ceases with the death or delivery of the fœtus—gradually diminishing, and, after a few weeks, disappears.

The correctness of this opinion is, we think, sustained by the whole history of puerperal convulsions, and forms the best foundation for those principles, which will be the surest guide to the practitioner in his contest with this frightful malady.

This opinion, however, is not in accordance with those lately promulgated, and which are gaining the countenance of the profession. M. Cazeaux, who so well represents the supporters of the new theory, declares that *albuminuria* is the predisposing cause of puerperal convulsions, inasmuch as there are very few cases of convulsions in which albumen is not found in the urine. He, however, considers that the presence of albumen in the urine is a mere symptom or indication of granular nephritis, and that both these affections are the result of a vitiated condition of the blood. This,

also, is the opinion of Drs. Lever and Simpson, in Great Britain, of M. Braun and others, in Germany. To this vitiated condition of the blood has been given the name of "*toxiœmia*," or, what is more frequently employed, "*urœmia*." Hence, these authors speak of uræmic convulsions, or eclampsia, as being synonymous with puerperal convulsions.

Puerperal convulsions, they say, seldom, if ever, occur without a previous vitiated condition of the blood, although it is acknowledged that uræmia may be present in a great number of cases, without any convulsive disturbances. M. Blot states, that of forty-one women with albuminuria, but seven had convulsions, or about one in six. M. Cazeaux states the proportion as being about one in four.

When treating of the symptoms of pregnancy, (see page 95, *et seq.*), we stated the reasons for our dissent to this modern theory, believing that, although in the pregnant condition, the blood, in many respects, is altered, yet, in no correct sense of the word, can it be termed "vitiated;" it is healthy, furnishing, in abundance, nutritive materials for the mother and her child. The woman is in a physiological, not in a pathological condition, in a state of healthy, not morbid excitement. We also contended that albuminuria, which so often coexists with puerperal convulsions, is indicative of congestion of the renal vessels, or of general plethora, and has no necessary connection with toxicœmia in any of its supposed forms. Although, therefore, the presence of albumen in the urine, and the existence of anasarca swellings, should never be neglected by the prudent practitioner, they should be regarded as the evidences of hyperœmia, not of toxicœmia; the importance of this distinction in practice will hereafter appear.

The *temperaments* and *constitutions* of women may, in a minor degree, be considered among the predisposing causes of puerperal convulsions. These accidents may occur in almost every temperament, in every condition of the pregnant woman, and at any age. They are frequent in the delicate, sensitive, nervous woman, but occur still more frequently in the full and plethoric. Dr. Collins says they are most common "in strong, plethoric young women—especially those of a coarse make, and short, thick neck." Dr. Ramsbotham, also, says that, although the "delicate female" does not escape, puerperal convulsions are especially observed in the "stout, florid, robust woman."

It is universally acknowledged, also, that these convulsions are more frequent in *primiparous* than in *multiparous* patients. Dr. Collins states, out of twenty-five cases of convulsions, twenty-four were primiparous women, giving the proportion of ninety-six per cent. This has been explained by M. Rayer as arising from

the pressure made by the uterus on the renal vessels, causing congestion and inflammation of the kidneys; and in this opinion he is sustained by the advocates of the uræmic theory. The proper explanation, however, is, we think, referable to the greater activity of the circulation, and the greater disposition to plethora which exists in the young and healthy woman. Mere pressure upon the renal vessels is not, of itself, an adequate reason; inasmuch as such pressure often exists in cases of ovarian and uterine tumors, often of great size, where there are no evidences either of albuminuria or nephritis.

Exciting Causes.—These are exceedingly numerous; indeed every strong impression made on the nervous system of a pregnant woman may throw her into convulsions; her liability to this disturbance will be in proportion to the sensitiveness of the cerebro-spinal system, and to the severity of the exciting cause. Powerful mental or moral impressions not unfrequently excite convulsions *during pregnancy*, even when there has been no premonition or suspicion of danger. Irritations from undigested food or other acrid ingesta in the stomach, from bile, from feculent or other irritating matters in the intestines, and from gaseous accumulations, are also very common exciting causes during gestation. To these may be added changes of temperature, especially from heat to cold; also, says Dr. Ramsbotham, electric changes in the atmosphere. The occurrence of severe pain, such as gastrodynia, colic, violent attacks of neuralgia, severe falls or blows, are also among the occasional causes.

During labor, convulsions are often produced or aggravated by the severity of the pains arising from the contractions of the uterus, or from obstetric operations. They may also be caused by the pressure of the child upon the os uteri, but more frequently from pressure upon the obturator and sacro-sciatic nerves, and upon the sensitive tissues of the perineum and vagina. The “bearing-down efforts” must be also regarded as a common and efficient exciting or aggravating cause. This has not been sufficiently noticed as a cause of convulsions. Every one, however, is familiar with the fact, that whenever there is a bearing-down effort, the patient “holds her breath,” that is, for the time interrupts the respiratory process; hence, venous congestion of the lungs, of the right side of the heart, and of the veins, especially of the neck, face, and brain, which aggravates any predisposition to cerebral or spinal disturbance.

Congestion has usually been stated as one of the internal or “centric” causes of convulsions; it should, however, be considered rather as a secondary or aggravating cause; as it is difficult to conceive how any

engorgement of an active character can take place without previous irritation. Although secondary, it is, however, one of the most important and dangerous elements in these terrible affections, greatly augmenting in the first place the cerebral and spinal irritations, and afterward contributing to stupor, coma, and death, with or even without serous or sanguineous effusions.

The presence of the child in utero has been very universally arranged among the exciting causes. This, we think, an error, which has been productive of much mischief. It is certainly, however, a predisposing cause, as has been already mentioned. Hence, so long as it lives in the womb, the predisposition to convulsions may be augmented, but on its death or delivery, the symptoms of nervous and vascular excitement diminish and disappear; there is no evidence that the foetus, *per se*, excites spasms or convulsions. So long, therefore, as uterine pain and the bearing-down efforts are absent, no excitation is caused by the continued presence of the child in utero. The practical importance of this distinction will appear in the sequel.

Diagnosis.—These convulsions, although peculiar and restricted to the puerperal state, are nevertheless very similar to other clonic or tonic spasms, from which it is difficult and sometimes impossible to distinguish them.

When mild, therefore, they simulate very closely *hysterical* convulsions, being of a nervous type, and preceded by mental agitations, præcordial oppression, globus hystericus, etc. They may, however, be distinguished from hysteria, by the patient losing her consciousness, by a greater degree of stupor, by the absence of jactitation of the whole body, and by the gradual and imperfect restoration of the sensorial functions. There is also, even in slight forms of puerperal convulsions, more congestion of the blood-vessels and more pallor or lividity of the cutaneous surface.

The distinction between eclampsia and *epileptic* convulsions is much more difficult; the paroxysms in either case are very similar. In the latter, however, there is no subsequent stupor, and no immediate repetition of the fits, and, M. Cazeaux says, no albumen in the urine. The history of the case assists the diagnosis, inasmuch as epilepsy seldom originates during pregnancy; indeed, it is stated that if previously existing, it rarely supervenes after fecundation. Thus Dr. Tyler Smith states, that during fifty-one pregnancies, in fifteen epileptic women, there were but two cases of convulsions during gestation or delivery. Dr. Churchill says that among all his patients afflicted with epilepsy, only one had puerperal convulsions.

An interesting and somewhat peculiar case occurred

to the author in the wife of a practitioner of medicine. Eight days after being delivered of a healthy child, and apparently doing very well, she was suddenly seized with most terrific convulsions, the paroxysms returning with very slight intermissions for seven hours; the loss of consciousness and coma were very decided. During the last paroxysm, respiration, for a few moments, was entirely suspended. She revived from this state of asphyxia, and perfectly recovered. About two years afterward, when six months advanced in pregnancy, she had another convulsion, comparatively slight and of short duration. At term she was delivered, without accident, and remained well for six weeks. At this time she had a convulsion of the epileptic character, to which she was afterward liable. She survived upward of twenty years, her mental and physical powers very gradually deteriorating. There was no subsequent pregnancy. Gestation, in this case, seemed to be the remote cause of epilepsy.

Apoplectic convulsions differ from eclampsia in being much more slight, with far less agitation of the muscles, while the stupor is more profound, stertorous respiration is deeper, the countenance less livid, and they are often accompanied with complete paralysis. The fit is not recurrent. In eclampsia, however, of a severe type, there is often heaviness, coma, and stertorous respiration, indicating great congestion, and exciting a suspicion of serous or bloody effusions. Such symptoms are of course very alarming, but in true eclampsia there is no paralysis, and the patient may perfectly recover. Mr. Abernethy has termed such cases "nervous apoplexy," even when death results under these circumstances. There are many cases where, on examination, no congestion, effusion, or other lesion can be detected.

The diagnosis of eclampsia, as respects catalepsy, tetanus, inebriation, with which it is said it has been confounded, can afford no difficulty to the accurate observer who is acquainted with the characteristic marks of these various convulsive affections.

Pathology.—This is, of course, involved in obscurity. It is essentially, however, a disease of the cerebro-spinal system. Many of its forms resemble other varieties of nervous affections; nevertheless it has its peculiar character, not being, as already pointed out, simply hysteric, epileptic, or apoplectic.

Although strictly a nervous affection, yet there is great disturbance of the circulatory system, giving origin to congestions of the brain, spinal marrow, and other organs, which will greatly aggravate the original affection, even to fatal results.

M. Cazeaux, who contends for the peculiar character of eclampsia, defines it as "an affection characterized

by a series of fits, in which nearly all the muscles of relation, and also often those of the organic life, are contracted convulsively, and which fits are usually accompanied with or followed by a more or less complete suspension of the sensorial and intellectual faculties for a variable period."

We agree with Dr. Ramsbotham, that there is a great resemblance between puerperal and infantile convulsions. In both there is great sensibility of the nervous system, and great activity of the circulation. Hence, slight causes, comparatively, may produce severe and dangerous convulsions, complicated with congestions, and recoveries may be anticipated, although a fatal termination is always to be dreaded. In each, also, post-mortem examinations seldom manifest any important lesion. Some late observers, also, entertain the opinion that albuminuria may be found, not only in puerperal, but in infantile cases of convulsions.

Prognosis.—This must always be doubtful. It is more favorable when occurring in the nervous, hysterical woman, when the paroxysms are comparatively short, when the intervals are decided, and marked with a return of consciousness and sensorial activity, when the fits are not frequent, and, especially, when the exciting or aggravating causes are speedily removed.

On the contrary, the prognosis is more unfavorable when the fits are prolonged, when they rapidly return, when the coma is profound during the intervals, when the respiration is stertorous, and becomes irregular and intermittent, when the pulse is feeble, and the evidences of venous congestion of the brain, heart, and lungs are very decided.

Nevertheless, no case is to be despaired of. Many patients have recovered when the asphyxia had been decided and prolonged, and when the stertorous respiration and deep coma would indicate the existence of apoplectic effusions. The cerebro-spinal system of a pregnant woman may, like that of the young infant, simulate the most serious forms of nervo-vascular disease; and yet, in many instances, no serious lesion occurs, and recovery is often sudden, rapid, and perfect.

The prognosis is generally more favorable during gestation than during labor. The convulsions may subside, and the patient go safely to the full period. Not unfrequently, however, they induce labor which is always unfortunate. The attack, when commencing during the first stage of labor, is more severe and persistent than when manifested during the second stage. Convulsions originating after delivery are less dangerous; but the prognosis must be bad, if the fits occurring during labor subsequently continue.

As respects the *infant*, the prognosis must be doubt-

ful; as, from various causes, its life is often endangered during the existence of puerperal convulsions. It is reported that the child is often convulsed in utero, that, after birth, its muscles are stiff, or, even if apparently well, it will be suddenly seized with fatal spasms and convulsions. Dr. Merriman states that, out of fifty-one births, thirty-four were still-born—about sixty-six per cent. We feel convinced, however, that this proportion is too large, and that, in many of the cases where the child is still-born, it arises from injudicious management of the labor, rather than from any deleterious influences propagated from the mother to the infant.

The induction of premature-labor, forcible deliveries by version and the use of the perforator, have, doubtless, increased the number of still-born children in cases of eclampsia.

The frequency of convulsions is, fortunately, not very great. The statements of authors vary, however exceedingly. Thus, while Velpeau reports their frequency as one in a thousand, Madame Lachapelle fixes it at one in two hundred. Dr. Churchill, in his elaborate tables, gives the average of French and English practice as being one in six hundred and nineteen nearly; and we have already mentioned that they are comparatively more frequent in primiparous women, in the proportion of ninety-six in the hundred.

True puerperal convulsions seldom occur before the sixth month of utero-gestation. The liability increases as pregnancy advances, and is greatest during the sufferings and bearing-down efforts of the parturient process.

Treatment.—From the history given of puerperal convulsions, the indications for their management are clear—

First. To diminish or remove the plethora in congestions.

Second. To quiet the cerebro-spinal irritation.

The *first indication*, to relieve congestion, is the most prominent and important object. The patient is not safe from effusions or other organic lesion, so long as congestion exists; and such effusions may possibly occur very speedily. Prompt measures, therefore, are immediately demanded, and no remedy is so effectual and so rapidly beneficial as the *loss of blood*. The moment, therefore, a patient exclaims "I cannot see," or complains of violent pain in the head, the arm should be tied, and a large vein opened. If convulsions have already supervened, the practitioner should not wait for a termination of the paroxysm, but operate immediately, for fear that irremediable mischief might at once ensue. This is contrary to the advice of many experienced practitioners, who affirm

that it is difficult to operate during the height of the jactitations. The operation can, however, usually be performed, and will quickly contribute to the relief of the congestion, which is every moment augmenting during the paroxysm.

The blood, at first, is of a very dark color, and although the opening of the vein be large, it flows slowly; but very soon it acquires impetus, flows freely, and becomes, as respiration improves, of a brighter color. The relief thus afforded to the pulse, heart, lungs, and brain is very great, especially when a sufficient quantity of blood has been taken. With most patients, fifteen or twenty ounces must be regarded as a small bleeding; double, treble, and, occasionally, even more must be taken to insure safety. In plethoric patients, in one or more hours the operation must again be repeated to the extent of twenty or thirty ounces, and occasionally the patient will tolerate even two or more bleedings. This bold practice is seldom followed by syncope, exhaustion, or any other bad consequences. That some patients cannot bear bleeding, even when convulsed, may be true; that in many who are delicate and feeble, small bleedings should only be employed, there can be no doubt; but these are comparatively few. The disposition to plethora and the dangerous character of congestions, during convulsions, are so great, that there are few individuals who will not bear the loss of some blood with advantage. Much judgment, of course, should be exercised in the employment of this powerful agent. Failure of the pulse, the pallor of the surface of the body, and the disposition to syncope, will readily indicate the quantity of blood to be abstracted. There is little reason to apprehend that, under these circumstances, the convulsions may be continued or increased by the lancet. Many practitioners have inferred, because convulsive motions are among the last acts of life, after severe hemorrhages, that, therefore, the lancet may be detrimental in puerperal convulsions, especially where there is chloro-anæmia. Of this there can be very little danger under the direction of an educated practitioner, who ought to be able to distinguish between the violent agitations of eclampsia, complicated with a hissing and stertorous respiration, with a turgid, livid condition of the skin, and other signs of asphyxia, from the quiet convulsive motions, attended with the failing pulse and the pallid skin of a victim of hemorrhage.

The propriety of this treatment—notwithstanding the various theories broached as to the chloro-anæmic condition of pregnant women, the impoverished state of their blood, or that this vital fluid is actually poisoned by urea, oxalic acid, carbonate of ammonia, or

other deleterious agents—is very universally acknowledged; all say that congestions exist and that they are dangerous. There is, says Dr. Tyler Smith, one of the strong advocates of Toxicæmia, no time for the depuration of the blood; bleeding must be immediately employed. M. Cazeaux affirms that it should have the “precedent” over all other remedies. Prof. Simpson, of Edinburgh, and M. Braun, of Vienna, make the same acknowledgment. Dr. Ramsbotham, Jr., of London, calls the lancet the “sheet anchor” of the practitioner. The language of Burns, Churchill, Collins, Dewees, and Meigs, is not less strong. Dr. Gooch declares he never lost a patient when free bleeding had been resorted to. Warnings, of course, are given against its abuse, especially in purely hysterical cases, and where there is great debility; but, nevertheless, its recommendation is very universal, and there are few who cannot testify, from their own experience, as to its safety and efficiency.

Cups and leeches are often employed as a substitute for the lancet, where this is forbidden, or as advantageous, when general bleeding has been carried as far as prudent. Their efficiency, however, is not great.

Cold applications to the head, assisted by heat, sinapisms, and other rubefacients to the extremities and also to the surface of the body, are advantageous in equalizing the circulation, relieving congestion, and promoting reaction. Care, however, should be taken that they are not too powerful or too long continued on one spot, as the patient is insensible and makes no complaint. The irritation produced may be excessive, and be followed by severe inflammation or even mortification.

Blisters have been much employed, and may, in cases, be useful; they operate, however, too slowly, and become very troublesome, and sometimes decidedly injurious to the patient when convalescent.

Stimulating *enemata* may also be employed very advantageously by emptying the intestines, by promoting the secretions, and also as revulsives. Preparations of senna, salts, spirits of turpentine, etc., are often useful for this purpose.

Cathartics can never be given during a paroxysm, and in severe cases the patient cannot be made to swallow during the intervals. Whenever, however, there is an opportunity, purgatives should be administered, with the conjoint design to remove various sources of irritation, to promote the secretions and excretions of the alimentary canal, and thus to revulse from the head and relieve congestive tendencies. Six, eight, or ten grains of calomel should be administered at the first opportunity, as being the most efficient remedy to fulfil the above indications. Castor oil, senna, or the

saline medicines may be afterward administered, and subsequently they may be repeated according to circumstances.

The *second general indication* is to quiet the cerebro-spinal excitement. This great object is to be attained by indirect and also by direct measures.

First. *Indirect Measures*.—These have reference to all the exciting and aggravating causes of puerperal convulsions. To remove the cause of nervous irritation is by far the most efficient mode of quieting inordinate excitement. Direct measures, while the cause continues operative, are comparatively inefficient.

Congestion, although probably not an original cause, is one of the most dangerous of the accessory or aggravating causes of cerebral irritations. Bleeding, therefore, cathartics, revulsives, etc., while they relieve the engorgements and diminish the danger of effusion, contribute exceedingly to quiet cerebral irritations. By their agency, also, the activity and plethora of the general circulation are reduced, so that relaxation, bordering on syncope, contributes to the dissipation of the nervous excitement.

Gastric irritation, very often the sole exciting cause, should be relieved as soon as possible. The inability of the patient to swallow often prevents the fulfilment of this important indication. Bleeding, however, often contributes to nausea and vomiting; and as soon as the patient is able to swallow, a few grains of ipecacuanha or sulphate of zinc, or even of tartarized antimony, and the free exhibition of warm water, may excite emesis, and thus afford a great and sometimes immediate relief—the patient wakes up to a consciousness of her present condition.

Objections have been made to emetics as determining blood to the head; hence, it will be generally prudent to precede their employment by venesection. Congestion, however, being moderated, vomiting is safe and also very useful, not only for removing offensive matters from the stomach, but by promoting the various secretions of the body and determining healthy reaction in the external capillary circulation.

Intestinal irritations can be partially obviated by immediate recourse to enemata, and by cathartics as soon as the patient can swallow. They are useful, also, by facilitating the discharge of gaseous collections in the stomach and bowels. For the same purpose, also, mild stimulating drinks, such as infusions of mustard, mint, ginger, and after congestions have been relieved, diluted brandy, whiskey, etc., are beneficial.

Irritations from a distended bladder should be relieved by the catheter. In every instance of convulsions, this instrument should be employed, as the patient can give no account of her sensations, and the

retention of urine may produce much and even serious mischief.

Uterine irritation, including labor, and all its attendant circumstances, has engrossed the attention of practitioners sometimes to the exclusion of other serious sources of mischief. Many questions have been agitated respecting the management of the uterus in eclampsia, and although there is a greater unanimity of opinion than formerly, yet many questions are still undecided.

If convulsions occur during gestation, should premature labor be induced?

Those who look upon pregnancy as an exciting cause of convulsions, insist that the woman cannot be safe until delivered, and therefore, if convulsions do not yield to treatment, insist that labor should be immediately brought on in almost all cases. Others, however, would postpone interference; and many acknowledge that it should be the last resort of the accoucheur. The author, believing that gestation is but a predisposing and not an exciting cause of convulsions, and that the presence of the child in utero is not a source of irritation, has always declined the proposition to induce labor during gestation; and has never had any reason to regret acting upon this principle. He has had many cases where the mother has been preserved and the infant born alive some days or months after severe and continued convulsions.

The arguments against the induction of labor are strong. The uterus is quiet, there is no contraction of its fibres, and no reflex influences upon the spinal marrow and brain. By exciting labor, contractions are necessarily produced and are followed by irritations in the body of the uterus, in the cervix and os uteri by the pressure of the child against the large nerves and the sensitive tissues of the pelvis, and by the distension of the perineum. All of these are among the most common and severe sources of cerebral and spinal irritation, which will be aggravated by the bearing-down efforts they occasion, increasing the respiratory disturbance, and augmenting the venous congestions. In many cases, also, in order to accomplish delivery, the hand, the forceps, or some other instrument, must be employed, which, under these circumstances, will often prove very dangerous, if not fatal. All these sources of irritation are avoided by allowing gestation to continue. If the practitioner, therefore, confines himself to relieving congestion, to removing all sources of irritation from the stomach, bowels, bladder, etc., and to resorting to other appropriate measures to relieve spasms and convulsions, the patient will be far safer than by superadding the sufferings of labor to the original cause of her malady.

The life of the child, although of secondary import-

ance, must not be forgotten. If pregnancy continue, it is comparatively safe; if labor be induced, its life is greatly jeopardized. The dangers arise from its being premature—its powers not sufficiently developed—from its being compressed in the uterus against an undilated cervix, and especially from its being subjected to all the dangers of a “forced delivery” through the os uteri and the obstetric canal, not properly dilated, or sufficiently relaxed. Few children survive these complicated difficulties.

To all these objections against the induction of labor may be added the uncertainty that any good will result. All practical authors affirm that convulsions may continue, and often do continue after delivery; and there can be little doubt, from the facts mentioned, that the persistence and even the fatality of the complaint are to be attributed to the operation thus injudiciously undertaken.

If pregnancy be allowed to continue, the patient may die undelivered, but the probability of her escape from the dangers of puerperal convulsions is far greater than by subjecting her to the additional irritations arising from labor. There may be possibly some exceptions to the rule, but certainly they are very few. M. Cazeaux doubts the propriety of premature labor in almost every case, believing that the means employed to bring on labor, and the necessary delay before it can be induced, are strong arguments against its employment. One exception, he says, may exist, where the woman has convulsions in every labor, with continually increasing severity.

During the first stage of labor, the same general directions must guide the practitioner. All the usual treatment should be diligently employed, but no artificial delivery should be attempted. Relaxation and dilatation of the os uteri should be facilitated by means of the lancet, by warm mucilaginous injections into the vagina, and occasionally by belladonna ointment, and, in a few instances, which will be presently mentioned, by the employment of opiates and anæsthetics.

Palliative remedies, therefore, are alone justifiable during the first stage of labor.

Such, however, has been the anxiety of accoucheurs to hasten the progress of labor, and to empty the uterus, under the idea that the presence of the child is an exciting cause of the convulsions, that they have very generally resorted to “*forcible delivery*.” Before the os uteri is completely dilated, and often while it is still rigid, the membranes have been ruptured, the hand has been introduced, first into the vagina, and then as soon as practicable into the uterus, so as to accomplish the version and delivery of the fœtus. This operation has been recommended as soon as the os uteri is of the size of a

"crown piece," or about an inch and a half in diameter; and many, especially upon the continent of Europe, have advised that incisions be made on the interior of the os and cervix, so as to favor the forcible entrance of the hand. The results of this practice are very universally the death of the infant, and to the mother they have been exceedingly unfavorable, arising from the pain excited by the operation or by the contusions and lacerations of the cervix, from subsequent inflammation, and occasionally from actual mortification. Dr. Churchill reports that five out of seven mothers perish after the operation of version in puerperal convulsions.

Experience, therefore, as well as theory, is opposed to forcible delivery; and most late writers either condemn it, or would restrict it to cases which they would consider otherwise desperate. Thus M. Cazeaux observes, that if, after the usual measures have been fully tried, the convulsions and coma continue to augment, multiple incisions should be made in the cervix, and the hand introduced. Even then not much, however, is to be anticipated, we think, from the operation, as it is very painful, and as the convulsions very generally continue after delivery.

Dr. Ramsbotham, also, would resort to version, if bleeding has been carried as far as practicable without good effect.

Although, therefore, late practical writers object to forcible dilatation of the os uteri, yet many, such as M. Cazeaux, Drs. Ramsbotham, Tyler Smith, etc., would often *rupture the membranes* to hasten the process of labor. This advice, however, is contrary, we think, to sound principle, and also to experience; for as soon as the membranes are ruptured, the child becomes exposed to danger, the contractions of the uterus become more forcible and painful, the bearing-down efforts are excited, and the dilatation of the os is often retarded, instead of being accelerated. It is far better to wait until full dilatation has been accomplished.

During the second stage of labor all the circumstances are entirely altered, so that *artificial delivery*, with few exceptions, becomes the duty of the practitioner.

The uterine contractions and the bearing-down efforts, which accompany this stage, are among the exciting causes of cerebral irritation and congestion; their severity and continuance must aggravate the dangers of the patient. The sooner, therefore, the labor is terminated, the less effort will be made by the mother, and the greater, *ceteris paribus*, will be her safety. Therefore, the interference of art is demanded. By artificial measures, the duration of labor will be greatly shortened, the bearing-down efforts will be, in a great degree, avoided, and even the contractile

efforts of the uterus, and the consequent suffering will be lessened.

The *mode of accomplishing delivery* must be accommodated to the circumstances of the case. In all *vertex* presentations the *forceps* should be employed, not merely when the head is at the inferior strait, or in the cavity of the pelvis, but when it is at the superior strait. The os being dilated, and the membranes ruptured, it is difficult to conceive any serious objection to the forceps, when the vertex presents, even when it is at the brim of the pelvis. Little or no pain is excited by their application, and the subsequent sufferings are simply those necessarily attendant on the descent and pressure of the child. If there be any malpresentation of the head, it should be corrected, according to prescribed rules, and then the forceps may be applied.

Version has been recommended, when the head is high up, as a substitute for the forceps. This operation, however, is far more painful and dangerous for the mother and her infant. The presence of the hand and the arm in the uterus is always excessively painful; and, if the waters have been evacuated, the operation becomes more severe, more difficult, and is not unfrequently followed by contusion and laceration. At the present day, it is not frequently resorted to, and many of its advocates are so aware of its dangers, that they recommend that complete anæsthesia be induced before operating. Version, therefore, should be restricted to a few rare cases of trunk presentations.

In *pelvic* presentations delivery should be facilitated by the blunt hook or fillet, and afterward by the hands or forceps, according to the various circumstances attending such presentations.

Craniotomy has also been employed by accoucheurs, whose anxiety for speedy delivery would not tolerate further delay, believing that the mother must perish, unless delivered, and that the life of the child should not be considered. In ordinary cases, nothing, however, is to be gained by the operation; the forceps are fully adequate for the mother's welfare, and may prove equally advantageous for the infant. Perforation, therefore, is to be restricted to cases of deformity of the pelvis, or of the child, and, perhaps, to a few instances, where the child is dead.

During the third stage of labor there is far less danger of uterine irritation. The contractions of the uterus to arrest hemorrhage, and expel the placenta from its cavity, and the bearing-down efforts to force it from the vagina, are comparatively trifling. Hence, the practitioner should not be anxious to interfere; a little pressure and frictions upon the body of the uterus, and slight traction upon the cord, *secundum*

artem, after the uterus is firmly contracted, are alone necessary in a vast majority of cases. If, however, from any unfortunate complication, the introduction of the hand into the uterus becomes indispensable, the operation should be delayed as long as may be prudent, so that the nervous system of the patient may have time to recover from the shock which it has experienced. It will be advisable, also, to precede the operation by the employment of opium, or, perhaps, still better, by etherization; for there is great danger of re-exciting the convulsions by the introduction of the hand into the uterus. Dr. Ramsbotham gives us a very instructive case, in which a lady had been safely delivered during severe convulsions. She had recovered her consciousness and intelligence, and it was thought necessary to remove the placenta artificially. The presence of the hand in utero excited severe pain, the convulsions returned, and the patient perished; no doubt, says Dr. Ramsbotham, her death was occasioned by this untimely interference.

Mental and moral irritations often give rise to puerperal convulsions. Hence, whenever there is any returning consciousness manifested, the utmost precaution should be taken to insure mental tranquillity. The room should be darkened, perfect quietude should be enjoined, all conversation prohibited, and even the inquiries of the patient should be evaded, as far as practicable. It is best, as a general rule, to say nothing of her labor, of the birth of the child, even should it be living, and in a healthy condition, or to make any allusion to her labor and its consequences.

Second. *Direct Measures*.—Although far less important than those already mentioned, these are, nevertheless, when judiciously employed, very advantageous.

Narcotics were originally regarded as the best remedial agents in puerperal convulsions; camphor and opium were highly extolled. Under this practice, however, the mortality was fearfully great, at least fifty per cent. perishing. The introduction of free bleeding by Denman, Ramsbotham, senior, Dewees, and others, have greatly relieved the mortality, which is now rated at twenty-five per cent.; and probably less when the patient has been judiciously treated. The success of the depleting plan has been comparatively so great that narcotics were for a time discarded as exceedingly dangerous. Dr. Dewees regarded them as aggravating cerebral congestion, and conducing to fatal results. Experience, however, has taught the practitioners of the present day properly to appreciate both the evacuating and the narcotic plans of treatment. If the loss of blood be very universally essential to the safety of the patient, opium and its congeners are often very important adjuvants.

Perhaps no accoucheur would now venture to exhibit opium and its preparations until the symptoms of congestion have been very decidedly removed by the evacuating and revulsive treatment.

When bleeding, therefore, has been carried as far as may be prudent, and there is still a tendency to convulsions, or to mental or nervous excitements, a full dose of opium has proved very advantageous in quieting the symptoms of nervous irritation, and preventing the reflex influences of uterine contractions, etc., upon the spinal marrow and brain. In hysteric or milder forms of convulsions, little depletion may be necessary before its exhibition; but, where there is much stertorous respiration and great coma, the employment of opium should be long postponed. Dr. Collins and Dr. Ramsbotham, Jr., recommend it as valuable after delivery. In doubtful cases, preparations of camphor, hyoscyamus and lactucarium, may be occasionally substituted.

It is often preferable to administer these anodynes per rectum, that they may more decidedly influence the uterine and pelvic irritations.

Ointments of opium and belladonna, especially the latter, have been applied per vaginam. Belladonna ointment, applied to the os uteri, is strongly recommended, to diminish its sensitiveness and promote dilatation.

Anæsthesia has, of late years, been employed in the treatment of puerperal convulsions, and, although its use was opposed upon theoretical principles, it has proved very advantageous under the same circumstances in which opium may be safely administered. It should, therefore, be restricted to purely hysterical cases, or to those where much nervous excitement, general or local, remain after congestions of important viscera have been relieved. Neither should anæsthetics be administered where there are organic affections of the brain, heart, or lungs. Under ordinary circumstances, after depletion, they quiet mental or moral excitement, moderate or relieve the convulsions, and often prevent the return of the paroxysms. Anæsthesia also favors the relaxation of the os uteri and vagina, thus facilitating the progress of labor, and will enable the patient to endure operations which might otherwise prove fatal. No serious objection has of late been presented against its employment under the circumstances designated. When, however, there is congestion or great coma, its administration is contra-indicated.

Much testimony could be accumulated as to the safety and advantage of anæsthesia in puerperal convulsions. Professor Channing, of Boston, early employed it, and relates ten cases in which six mothers

recovered, and three children were born alive. Dr. Churchill has used it very advantageously in several cases. Dr. Shekleton, of Dublin, reports its employment in nine cases, in five of which the convulsions were completely arrested, and in four they were moderated. Dr. Braun, of Vienna, employed it in sixteen cases, and all completely recovered. Dr. Tyler Smith speaks favorably of its use. Professor Simpson has also employed it advantageously, and suggests that it acts beneficially by producing a "temporary diabetes mellitus." M. Cazeaux recommends its employment after depletion, where rigidity of the os uteri or convulsions continue: it lessens their frequency, and sometimes prevents their return.

Such is a summary of the treatment which experience has, at the present time, proved most efficient in puerperal convulsions. Its success has been comparatively very great, the mortality being diminished nearly fifty per cent.; and when the principles which should regulate the practitioner are better understood and judiciously carried out, more favorable results may be anticipated for mother and child.

Although the *Convalescence* after puerperal convulsions is generally rapid and complete, yet, occasionally, unpleasant symptoms remain. If there be loss of memory, giddiness, vertigo, headache, and other cerebral symptoms, great attention should be paid to avoid all excitation of mind and body, and, at the same time, to employ revulsives, diuretics, etc., to prevent or relieve congestions. Nevertheless, the strength of the patient is to be supported by small quantities of nutritious food, being careful to avoid indigestion. Fresh air, moderate exercise, mild tonics, and the occasional exhibition of antispasmodics and narcotics will be required. If there be much mental excitement, and, especially, if there be mania, the same general treatment is demanded; but narcotics, in such cases, may be more freely administered, and the occasional resort to etherization has been strongly recommended.

Epileptic and *apoplectic* states, with or without paralysis, are rarely the sequelæ of convulsions; but, if found, demand no peculiar attentions.

The Prevention of Puerperal Convulsions is, however, of equal, if not of greater importance than their successful treatment.

If the principles which we have endeavored to establish be correct, the indications for the prevention of this terrible malady are very clear, viz.: to diminish plethora and vascular excitement, and to quiet nervous irritation by indirect and direct measures. As these indications are the same as those laid down for the management of convulsions, the same treatment must be adopted, although in a minor degree, for their pre-

vention. Hence, during the latter periods of gestation especially, the disposition to plethora should be guarded against by promoting the various secretions and excretions of the economy. This is most effectually done by exercise, sometimes amounting to fatigue, in the open air; by avoiding close apartments and hot rooms; by frequent tepid or cold bathing; and by the constant use, where the bowels are constipated, of laxatives. Diuretics and diaphoretics are very important in many instances, especially where the renal secretion is deficient, and, also, in all cases of dropsical effusions, whether internal or external. Diuretics have been objected to, as tending still further to impoverish the blood, by carrying off more of its albuminous element. Experience does not confirm this idea. On the contrary, the free excretion of urine before, and especially after, delivery, is one of the most effectual of the natural modes by which the albuminuria and the dropsies of pregnant women are dissipated. M. Frerichs, who maintains that the urea in the blood is, by some peculiar fermentation, converted into carbonate of ammonia, recommends benzoic acid, in doses of five or ten grains, colchicum, and also guaiacum, as augmenting the urea in the renal secretion.

Few things, however, are more important than attention to diet. The idea that the woman is weak, that she must gain strength to pass safely through her labor, is, we believe, most erroneous in a vast majority of cases, and productive, frequently, of the most fatal consequences. The sensations of languor, lassitude, and exhaustion are often purely nervous, or they may indicate an "oppressed" and not a "debilitated" condition of the vital powers. Hence, as pregnancy advances, and as symptoms of plethora are manifested, and especially where the patient is unable to exercise out of doors, the diet should be restricted. The quantity of animal food should be diminished, and the patient limited chiefly to farinaceous and other vegetable articles. We have for years advised, especially in primiparous women, the total abandonment of animal food during the last six weeks of gestation.

Connected with this subject of diet, it is important, in every way, to avoid indigestion, by regulating the quantity as well as the quality of the food; and, in all cases, to abstain from late meals. There is, probably, no more frequent cause of puerperal convulsions during pregnancy, than indigestion: especially, when occurring during the night.

When much plethora and vascular excitement exist, and, especially, when there are any evidences of local congestion, direct evacuation by the lancet is often of the greatest importance. The existence of tinnitus aurium, of blindness, or of severe pain in the

temples, forehead, or top of the head, demands immediate attention. Seldom should any time be lost. In many instances, the patient has hardly uttered the exclamation, "O, my head!" before she becomes insensible, and agitated by frightful convulsions, from which she may never recover. Free bleeding, when timely employed, will very universally prevent, and often arrest, this unfortunate consummation. When the evidences of irritation and congestion are located in the thorax or abdomen, the necessity for direct evacuation is almost equally great. In a melancholy case observed by the author, the patient, for some hours, complained of gastric pain and distress with much nausea, but was in perfect possession of her mental and moral powers. She suddenly exclaimed, "O, my ear! O, my head!" was slightly convulsed, became comatose, and died in six hours,—being about seven months advanced in gestation.

The quantity of blood to be drawn when there are no urgent symptoms should not be great; but, nevertheless, fifteen or twenty ounces should often be taken, and the operation, in plethoric women must, not unfrequently, be repeated.

The nervous system will be very much quieted and the patient comforted by these evacuating measures; nevertheless, the greatest attention should be paid to regulating her mental, moral, and physical sensibilities. All sources, therefore, of anxiety or agitation should be removed; pleasant companions and cheerful conversation should be provided, and the greatest care be taken to avoid irritation from internal or external causes.

Direct measures to diminish nervous irritation, when there are no evidences of vascular excitement or congestion, are often useful. Hence, antispasmodics, anodynes, occasionally even opium, may be demanded to procure sleep, relieve pain and spasms, and otherwise quiet nervous or hysterical excitement. Assa-fetida, valerian, ammonia, Hoffman's anodyne, and other milder articles should always have the preference; but, in some instances, a full dose of opium may be demanded to lessen severe gastric, uterine, or other pain, when the system is properly prepared for its exhibition.

In women who, from any cause, are weak and delicate, the above practice must be very carefully instituted. The evacuating treatment should be confined chiefly to laxatives and diuretics; and, not unfrequently, nutritious diet, tonics, and even stimulants should be cautiously employed under the direction of an experienced practitioner.

Acting upon the principles now detailed, women will suffer but little during gestation; the sensations of

fullness and oppression, of dulness and heaviness will be diminished, severe pains and local congestions be dissipated, and the disposition to dropsical effusions be greatly moderated, if not entirely relieved; and, finally, the liability to convulsions and to inflammatory diseases which often occur after parturition, will be lessened or destroyed. It may be added, also, that the benefits thus extended to the parent are equally influential for the child.

Firmly believing in the general truth of the principles and practice now recommended, the author cannot regard the advice given by many late high authorities as correct, or even safe. These gentlemen, adopting the chloro-anæmic theory relating to pregnancy, and maintaining that the blood is watery and impoverished, and often even in a poisonous condition during gestation, recommend nutritious diet, preparations of iron and other tonics, and even stimuli, as the best prophylactics, and as most effectual in preventing not merely the ordinary complaints of pregnancy, but the severe pains, spasms, and convulsions which not unfrequently supervene. Such practice, as already intimated, may be occasionally necessary, in exhausted constitutions, among women surrounded by the luxuries which abound in large and populous cities, but cannot be safely adopted for the vast majority of parturient females.

In justice, however, it should be remarked that, although advocating a tonic plan as the best prophylactic treatment, nevertheless, as soon as congestion, especially as soon as convulsions have appeared, they resort freely to the lancet and other modes of depletion. As Dr. Tyler Smith says, there is then no time for "depurating" measures.

RUPTURE OF THE UTERUS.

Under the head of *Rupture of the Uterus* may be included also ruptures of the superior or peritoneal portion of the vagina, as the symptoms, consequences, and treatment are very similar.

This terrible and often fatal accident is so frequently the result of an inordinate excitement of the uterus, that it is properly considered under the present division of complicated labors. The contractions of the uterus are, indeed, in a large number of cases of rupture, excessive; but, in other instances, contraction is moderate and yet laceration ensues, because the tissues of the uterus have been weakened. Even in this case, however, the excitement is *relatively* strong.

The *causes* are predisposing or exciting.

Predisposing Causes.—These include all those which impair the integrity or strength of the uterine tissues.

Authors mention an unusual thinness of the whole organ, which is occasionally observed. Hence, great size of the uterus from large quantities of liquor amnii, or from the presence of one or more children, has been considered as a predisposing cause. More frequently, the thinness exists in particular portions, especially about the cervix uteri.

Morbid states of the uterine tissues are not uncommon, such as inflammations, indurations, ulcerations, gangrene, or softening of spots or small portions of the uterus. Cicatrices in the vagina or uterus render these tissues liable to rupture: several interesting cases are upon record, where rupture has occurred at the cicatrix, resulting from the Cæsarean section. Cancerous affections, steatomatous, fibrous or other tumors in the substance or in the cavity of the uterus, predispose to the same accident. Dr. Channing mentions polypi as being causes of rupture.

To these predisposing causes may be added spasmodic contractions, partial or incomplete closure of the os uteri, deformities of the pelvis—particularly a great projection of the promontory of the sacrum, unusual sharpness of the linea ilio-pectinea, or irregular prominences at the brim of the pelvis—osseous or other tumors in its cavity, thickness, indurations, contractions, and adhesions of the vagina or vulva; indeed, any mechanical obstruction to the progress of the child.

Exciting Causes.—These are traumatic or idiopathic.

Traumatic causes operate externally or internally. The *external ones* include all the variety of injuries to which a woman is liable, such as contusions from falls or blows; also those severe accidents by which the uterus, or even the parietes of the abdomen may be more or less extensively cut or lacerated.

The *internal* traumatic injuries may also occasionally result from accident, but far more frequently from obstetric operations. It is lamentable to confess that the uterus and vagina have often been ruptured by injudicious and forcible attempts to perform version; often, also, by the vectis, by the forceps, crotchet, the cephalotribe, or other instruments in the hands of the ignorant, careless, and rash operator. M. Cazeaux states a case, in which two-thirds of the side of the uterus was removed by the craniotomy forceps. Minor injuries of the os uteri, of the vagina, bladder, and rectum are more frequently observed from the improper or forcible employment of artificial measures.

Idiopathic causes—often termed spontaneous, as arising without any mechanical injury—are dependent upon inordinate excitement or action of the uterine fibres, either positive or relative. If the uterine tissue, therefore, be strong, and in a normal state, it is

occasionally ruptured by the violence of its own actions. If, on the contrary, any portion of the tissue be injured or weakened, then a moderate contraction will produce rupture; relatively it is inordinate. Surgeons are familiar with such accidents as the rupture of the muscular fibres of the flexor and extensor muscles of the extremities, particularly, it is said, of the gastrocnemii. There can be no doubt that such lacerations may occur in the uterine fibres, sometimes, as has been supposed, from irregular contractions of the uterus—portions being comparatively inactive or passive, while others are spasmodically contracted. Such lacerations more frequently arise during the powerful and regular contractions of the whole organ, especially in obstructed labors. Hence, when the fetus is very large, from deformity or disease, as in cases of hydrocephalus; when there is a mal-presentation of the head or trunk; when the pelvis is deformed; when the vagina is unyielding; when there is a rigid os uteri or perineum; or when there exists any mechanical obstruction to the progress of the infant, the bearing-down efforts become inordinate, their severity continues to augment until the powers of the uterus or of the mother become exhausted, or until laceration of the vagina or uterus occurs. In labors, therefore, from obstruction, death generally ensues, either from rupture of the uterus, or from the exhaustion of the vital power of the patient, where artificial assistance cannot be rendered.

Such laceration will, of course, take place more readily when any predisposition exists. Hence, if there be softening, ulceration, gangrene, or thinning of any portion of the uterus, very moderate contractions may be followed by extensive lacerations. It often happens, also, that some traumatic lesion, comparatively slight, may exist, and yet be followed by extensive lacerations from subsequent uterine contractions. A slight wound made in the vagina or the os uteri, by the forceps, may be converted into a rent during the progress of labor. Dr. James D. Trask, in his excellent monograph on Rupture of the Uterus, states, that out of sixty-seven cases, the uterus was healthy in thirteen only, and in fifty-four it was more or less diseased; thus a predisposition to laceration existed in about eighty per cent. of the cases.

Rupture of the uterus occurs, also, occasionally from inordinate excitement, where there is no predisposition and no unusual mechanical resistance. Such excitations may sometimes be dependent upon the peculiar temperament of the woman, or upon great exaltation of her nervous or vascular system; but more frequently, it is produced by the exhibition of powerful stimuli, especially alcoholic, and not unfrequently by

the administration of the *secale cornutum*. The author has never met with a case of rupture of the uterus, with perhaps one exception, where the *ergot* had not been administered, and, doubtless, rupture has frequently resulted from the use of this medicine in cases which have never been recorded.

Ruptures of the upper part of the *vagina* may ensue from any of the causes just mentioned; there is one, however, which may be considered as peculiar to the *vagina*, viz., its continual, progressive elongation during the second stage of labor. As soon as the head has passed the *os uteri*, it greatly distends the vaginal canal, while the *os uteri*, being drawn up by every successive contraction of the longitudinal fibres of the uterus, pulls with it the upper extremity of the *vagina*, while the head of the infant depresses its lower extremity. This canal, therefore, is constantly elongating in each direction, during every protracted labor. This distension and elongation is often prodigious; it is, therefore, no matter of surprise that its tissues occasionally give way, especially when any predisposition from disease, injury, etc., may already exist.

Location.—Laceration may occur in any part of the uterus; the position often depends upon the local lesion, should any exist. During gestation it is, perhaps, most frequently observed in the body or fundus of the uterus; during labor it is more apt to occur at the *cervix uteri*, especially when there is great resistance at the *os*, or when the neck of the uterus is compressed between the head of the child and the irregular projections of the pelvis. There is reason to believe that the so-called ruptures of the uterus are not unfrequently vaginal, as it is not always easy, during life, to distinguish the thin portion of the uterus from the *vagina*, at the upper part.

The *extent* of the rupture varies exceedingly. In very many cases of tedious labor there is a slight laceration on the edge of the *os uteri*, or of the upper part of the *vagina*; these are, comparatively, of little consequence, as they are superficial; they soon heal and leave a *cicatrix*, which is seldom productive of much mischief. Ruptures, however, often implicate all the tissues of the uterus, sometimes to a slight extent, but, not unfrequently, they are so large that the whole body of the child may escape through the rent. They may run in any direction, circular, oblique, or longitudinal.

Occasionally, these lacerations are *partial*—that is, extending, in some instances, through the fibromuscular tissue, but leaving the peritoneal covering intact. Hence, the child does not escape, and even the blood, which is effused, is confined to the uterus, or infiltrated into the areolar tissue, under the peritoneum.

Cases are described by Duparcque, where the blood, thus effused under the peritoneum, covered a large portion of the uterus, giving it a dark, black color; while, in other instances, it passed into the pelvis, and even ascended to the loins. These cases, although very rare, may possibly occur more frequently than is generally supposed, especially as they are less dangerous, and women may have recovered when the accident has not been suspected. Dr. Collins states that in thirty-four cases of rupture of the substance of the uterus, the peritoneum was uninjured in nine, or about twenty-six and a half per cent.

The author has met with a most interesting and probably unique example of this partial rupture of the uterine tissue; but we have to regret that the history of the case is very imperfect. A woman, at about the eighth month of utero-gestation, was seized with labor-pains, and was attended by a midwife. The symptoms were moderate, and after some hours subsided, before the *os uteri* had dilated. There was, at the time, no hemorrhage, no vomiting, prostration, or other alarming symptom. Her health and strength gradually failed, and she requested the assistance of the late Dr. Nicholas Nancrede, who found her much debilitated, but still free from pain and fever. Death ensued in a day or two. The author assisted Dr. Nancrede in the post-mortem examination. The whole peritoneum was covered with a dark, "sooty" matter, very thin and closely adherent; there were no coagula of blood, no effusion of lymph, of pus, or other evidences of inflammation. The uterus was of normal size for the eighth month, but presented on the right and upper portion of the organ a complete orifice through its tissue, covered externally by the peritoneum, and internally by the membranes of the ovum, both intact. The feet of the fœtus could be distinctly seen through these tissues. This opening was peculiar in having no appearance of a rent; it was circular, about two inches in diameter, with the edges bevelled and smooth, presenting the appearance of a perforation, the edges of which had completely healed without obliterating the orifice. No further examination was made at the time, as Dr. N. desired to remove the whole uterus, and prepare it for more minute examination. No further record, however, has, to our knowledge, been given.

MM. Velpeau and Ramsbotham, junior, record a few cases of ruptures of portions of the *peritoneum* which have ensued without any laceration of the proper uterine tissue. This rare accident, not easily to be explained, is also mentioned by other authors. Considerable hemorrhage may take place upon the exposed uterine surface, and there is a great liability to subsequent peritonitis.

The frequency of rupture of the uterus is, fortunately, not great. It probably occurs, on an average, once in fifteen hundred cases; but on this point, statistics vary exceedingly; thus, Dr. Churchill reports ruptures as occurring once in twelve hundred and three cases; Ramsbotham as once in forty-eight hundred and eighty-seven cases; whilst Burns states the average at one in nine hundred and forty, and Drs. Clarke and Powell as one in four hundred and thirty cases.

This accident is not confined to any particular age of the woman, although it is represented as being more frequent about the age of thirty, probably from the fact that more women are delivered, between twenty-five and thirty-five years of age, than either earlier or later.

Neither does there seem any special connection between this accident and the number of deliveries. It happens frequently in primiparous women, and perhaps as often in third, fourth, or sixth labors. Thus Dr. Churchill states that out of seventy-five cases, it occurred nine times in the first labor, fourteen times at the second, thirteen times at the third, eleven times at the fourth, twice at the fifth, nine times at the sixth, eight times at the seventh, and the remaining nine cases were scattered between the eighth and eleventh labors inclusive. Dr. Trask, however, records twenty-four cases at the first labor, eighteen at the second, seventeen at the third, twenty-one at the fourth, eighteen at the fifth, sixteen at the sixth, and nine at the seventh.

Ruptures are said also to occur more frequently in births of male than of female children, which is referred to the fact that the head is generally larger in male children. Drs. Collins and M'Keever report, that in fifty-four births, there were thirty-eight boys and sixteen girls.

Symptoms.—As rupture of the uterus may occur either during the second or first stage of labor, and also during the latter or early periods of pregnancy, the symptoms which characterize this accident will be somewhat modified.

During the *second stage of labor* the symptoms are generally well marked. The contractions of the uterus are powerful, and the bearing-down efforts strong, immediately before the accident; the patient occasionally complains of an irregular pain, often of great intensity, fixed upon some point in the uterus, and is conscious that it "does no good." In other instances the first indication given to the mother is a sensation of tearing, or rending, the sound of which is occasionally perceptible to the attendants; there is an immediate cessation of the phenomena of labor; the contractions of the uterus and of the abdominal muscles

are suspended; the child ceases to advance, and very frequently the presenting part recedes, and becomes movable in the cavity of the pelvis, or at the superior strait. The retrocession sometimes is greater, especially when the rupture is at the cervix uteri, or at the upper part of the vagina, the child being forced, by the contractions of the uterus, through the rent into the cavity of the peritoneum, so that it is not readily felt, if at all, per vaginam. Hemorrhage simultaneously ensues, and is generally profuse, partly owing to the ruptured uterine vessels at the seat of injury, but mainly, says M. Cazeaux, to the detachment of the placenta, the uterus not always contracting firmly. This hemorrhage is generally considerable, and sometimes so large as to prove rapidly fatal. The discharge, however, is not always great externally, for large portions of blood are effused into the cavity of the abdomen. On a vaginal examination, the rent, if in the vagina or lower portion of the uterus, can be easily detected; and often also, if the child has retroceded, some portions of the intestines will be found in the pelvis, or even protruding externally. This descent of the intestines may also partially occur when portions of the child are still in the pelvis.

The results of an external examination vary. In all cases, the firm uterine tumor has disappeared. If the child remain in utero, the uterine swelling, although indistinct, and comparatively soft, will be generally recognized. If the infant has escaped into the peritoneal cavity, its outline can be readily felt through the parietes of the abdomen on the right or left side, forming an irregular tumor; while the contracted body of the uterus may sometimes be perceived high up in the lumbar region on the opposite side.

The general symptoms are those of rapid prostration. The nervous shock, the presence of the child among the intestines, and the loss of blood, are followed by a sense of exhaustion. Jactitation, pallor of the surface, contraction of the features, failure of the pulse, coldness of the extremities, short and oppressive breathing, nausea and vomiting, at first of the contents of the stomach, and afterward of dark porraceous matters, indicate the failure of vital power. Too often these are followed by a muttering delirium, the cessation of the pulse, and the clammy sweat, which precede dissolution.

When the child is retained in the uterus similar symptoms exist, but the prostration is not always so marked, and the prospect of recovery is greater. In cases of partial rupture of the uterus, where the peritoneal covering remains perfect, there is no effusion of blood into the cavity of the peritoneum, the symptoms are less urgent, and the probability of recovery somewhat greater.

During the *first stage of labor*, where the os uteri is undilated, the diagnosis is not always so readily established, as no part of the child has entered the pelvis; and as the orifice of the womb is often occupied by the membranes, there may be no external hemorrhage. Generally, however, there is some discharge of blood per vaginam, and the symptoms of rupture, prostration, and exhaustion may be equally severe, especially when the child is forced through the rent into the abdominal cavity. There are cases of rupture of the uterus, however, and occasionally of the vagina, where labor-pains, although diminished, do not so suddenly disappear, and if the child's head be very low in the pelvis at the time of the accident, and the perineum relaxed, it may be delivered.

During the *latter months of gestation* rupture may occur without violent contraction. The causes, as already mentioned, are very obscure, probably always dependent upon some organic lesion, as a predisposing state, while some fall, blow, or other accident are the immediate causes of the rupture; this is followed by the usual evidences of prostration, with a disappearance of the uterine globe, and the perception of the irregular form of the infant through the abdominal walls.

During the *early months of gestation*, the accident is exceedingly rare; Velpeau affirms that it may occur at the second, third, fourth, and fifth month, and Cazeaux quotes a case from Castelneau, of spontaneous rupture at five months. The accident may be suspected if it be positively known that the woman is pregnant, and if sudden evidences of prostration are manifested without any apparent cause; there is no external hemorrhage, and no portion of the embryo, owing to its small size, can be felt in the abdomen. The symptoms are precisely analogous to those from rupture of the cyst in extra-uterine pregnancy, from which it cannot be distinguished during life.

Prognosis.—Ruptures of the uterus were formerly regarded as necessarily fatal, even when artificial assistance was rendered. Hence Hunter, Denman, Burns, etc., advised that the case be left to nature, judging that all attempts to relieve only increased the sufferings of the patient, and hastened dissolution. Observation, however, since their time, has proved that many patients will recover even without assistance; and still a larger proportion when they have been judiciously treated. Thus Dr. Churchill reports nine persons recovered out of eighty, being about eleven per cent.; and, according to Dr. Trask's report, out of one hundred and fifteen cases "left to nature," twenty-seven recovered, or twenty-three and a half per cent.; while of two hundred and seven of artificial delivery, seventy-seven recovered, or thirty-seven per cent. It

may be added that, according to Dr. Trask's statement, even in fatal cases life was prolonged by artificial delivery. Thus, "of those delivered, fifty-four per cent. survived beyond twenty-four hours; while of those dying undelivered, but twenty-seven per cent. survived beyond the same period."

These reports are certainly very encouraging; nevertheless, as Dr. Trask himself observes, they only approximate the truth, and the prognosis must be very unfavorable. According to M. Cazeaux ruptures of the uterus prove "nearly always fatal to the child, and expose the mother to an almost certain death." Where, however, the lesion is in the lower part of the uterus, and the child and placenta are speedily delivered, recoveries are not very infrequent. Partial ruptures of the uterus are also less dangerous.

Where patients have recovered without artificial delivery, the child, in some instances, has been born by the uterine efforts. In other cases, it has become encysted in the cavity of the abdomen by adhesive inflammation, and the patient has survived, and often enjoyed good health for many years. Such cases, however, are exceedingly rare, because atmospheric air is very universally admitted through the rent, so that putrefaction of the child ensues, preventing the formation of a complete cyst. Hence, when the child is retained within the uterus, or in the cavity of the peritoneum, suppuration and abscesses are usually formed, the pus and the putrefying portions of the infant are gradually discharged through fistulous openings in the vagina, uterus, intestines, etc., so that eventually, after long and protracted suffering, with great exhaustion, the patient may recover. It does not appear, from any statistical tables, what is the relative proportion of recoveries under either of the terminations just mentioned. Doubtless, they are far more common when the child has been delivered. Cases of encystment must necessarily be infrequent; while few women can sustain the pain, irritation, fever, etc., resulting from the decomposition of the foetus in the abdominal cavity.

The causes of death, therefore, after rupture of the uterus, are, 1st. The nervous shock; 2d. The hemorrhage; 3d. The pain and irritation; 4th. The inflammation; and, 5th. The suppuration and putrefying processes consequent upon retention of the foetus. The liability to death, therefore, is much greater when the foetus and placenta are retained than where they have been spontaneously or artificially delivered.

After delivery has taken place, the danger of inordinate inflammation is very universally increased by the presence of atmospheric air, causing the putrefaction of the blood, or of other effused fluids. In a few in-

stances, also, death results from hernia of the intestines through the rent in the vagina, or sometimes through that in the uterus. In this last case, they may be strangulated by the contraction of the uterine fibres.

The *recoveries*, which are occasionally observed, are sometimes complete, the woman enjoying health and strength, and, in a few instances, has again become a mother. Subsequent pregnancies, however, are exceedingly dangerous, as the cicatrix resulting predisposes to laceration during pregnancy or delivery.

The dangers to the child are usually as great as to the mother; nevertheless, it occasionally survives, especially where the presenting part is low down at the time of the rupture, and it is speedily delivered by the uterine efforts or instrumentally. It occasionally happens, even when the child is thrown into the peritoneal cavity, that it survives for some time, as indicated by the motions of the infant, and, also, by auscultation. Cases are upon record, also, in which a living infant has been removed by gastrotomy, after the death of the mother. Dr. Trask quotes from the London Lancet, for December, 1827, a case of Mr. Green, where a living child was removed *thirteen minutes* after the mother ceased to breathe; and from the same journal, for September, 1837, a case reported for Dr. Dawson, where the foetus was found alive *fifteen minutes* after the death of the mother.

Treatment.—To prevent rupture of the uterus, as this accident is so terrible and fatal, becomes, therefore, a most imperative duty; but, unfortunately, the tendency to rupture can seldom be ascertained, and the means of prevention are limited.

The indications are, however, very evident, to moderate or remove the predisposing and exciting causes, and to diminish inordinate excitement.

The predisposition arising from various lesions of the uterus can seldom be detected. Nevertheless, in all those instances where the predisposition can be traced to the os uteri, to scirrhus or cancerous indurations of the cervix, to fibrous or polypoid tumors, to deformities of the pelvis, or, indeed, to any obstruction to the dilatation of the os uteri or to the descent of the child, it becomes imperative for the accoucheur to investigate the cause and nature of the obstruction; and to determine, at once, how far such obstruction can be removed, or, if this be impracticable, speedily to resort to artificial delivery.

This declaration may, at first, appear too positive, and may be regarded as justifying rash interference with the process of delivery. Let it, however, be remembered, that, when such obstructions exist, delivery is impracticable, and as soon, therefore, as the

judicious and experienced practitioner ascertains this fact, he knows that the mother and child must perish from rupture of the uterus, or from the exhaustion of the mother's powers. After reasonable delay, therefore, to confirm the diagnosis, the practitioner should no longer be passive. If the os uteri be rigid, proper measures should be adopted to promote its relaxation, and to diminish the violence of uterine action. These failing, careful incisions around the margin of the os should be made, rather than risk the danger of inflammation, gangrene, or laceration. If polypi exist, they should be removed. If the obstruction cannot be obviated, and be moderate in degree, the child may be delivered by manual or instrumental measures, which may not involve its life. If the obstruction be greater, craniotomy and the compressor cranii will be demanded, or even the Cæsarean section.

Where mal-presentation of the child exists, it should be corrected.

Inordinate excitement, relative or positive, is, as formerly observed, the usual immediate cause of spontaneous rupture of the uterus. To diminish such excitement, therefore, constitutes the leading principle which should govern the accoucheur in every case of labor, especially where any complication may exist. We would press the importance of this principle especially upon the younger members of the profession. We feel perfectly confident that the lives of many infants, and also of the parent, have been sacrificed by neglecting the practical application of this rule, under the idea of "trusting to nature," or of waiting, hour after hour, to see what "nature can do." Ruptures of the uterus, of the vagina, mortification, and collapse, have too frequently been the result. Of course, it will be all important to avoid the exhibition of stimuli, and especially of the *secale cornutum*, where there is any obstacle to the descent of the child. Hundreds of children have been lost, and numerous mothers have perished from the untimely exhibition of the ergot of rye.

The *Treatment after Rupture* has occurred should, also, be decisive, as the history already given demonstrates that the hope of recovery is never to be abandoned, and that this prospect is much greater when judicious and scientific treatment is proffered to the unfortunate woman.

This treatment must be modified, according to the various circumstances presented, and also whether the accident has occurred during gestation, or during the first or second stage of labor. In all, however, the general principle should be acted upon, that the removal of the child contributes to the safety of the parent.

If rupture, therefore, takes place when the presenting part of the infant is *in the cavity of the pelvis*, delivery may be accomplished, in vertex presentations, usually by the forceps, care being taken, in their application, not to embrace, in the grasp of the instruments, any of the intestines of the mother, or any lacerated portions of the uterus or vagina. In breech presentations, the blunt hook, or fillet, may be employed. If, however, the child be dead, and especially if there be any contraction of the pelvis or vagina, craniotomy may be proper, care being taken to fix the head of the infant by pressure upon the body through the parietes of the abdomen. If the head be high up at the superior strait, the use of the forceps demands great care, for fear important tissues might be injured; in such cases, craniotomy may be preferable.

Version by the feet may sometimes be demanded, where the body of the child still remains in the uterus, or even when it is thrown into the cavity of the abdomen. In the former case, as the hand is carried into the uterus, much caution is required, not to increase the rent. Hence, the uterus should be well supported by a hand over the fundus, so as to prevent its further elevation while the operation is performed. The author, in a case to which he was called, of a transverse rupture of the vagina on the left side, where the os frontis presented, after passing the right hand through the rent, recognized that the body of the child was still in utero. The hand was then withdrawn, and version was effected by carefully carrying the opposite hand through the os to the fundus of the uterus. If, however, the child has escaped into the cavity of the abdomen, version should still be employed, if the fœtus can be reached. The greatest caution, however, should be exercised not to injure the abdominal viscera, and especially to avoid compressing the intestines between the child and the walls of the pelvis.

During the first stage of labor, greater difficulties exist, as the os uteri is not fully dilated. In some few instances, where the os uteri is dilatable, and where the lacerated opening of the uterus remains relaxed, version should be attempted.

If the os uteri be more rigid, and the child be wholly or partially in the cavity of the uterus, an effort may be judiciously made to dilate the os uteri and deliver by version. When the body remains in the uterus, and the head has escaped through the rent, the difficulty of bringing down the child is often very great. M. Velpeau thinks the child may be strangulated by the contraction of the uterine fibres at the lacerated opening, and mentions the case of an infant becoming emphysematous, and enlarged to three times its natural size. In such cases, he, and also M. Cazeaux, suggest

the enlargement of the rent by means of the bistoury. This would be a bold and a very hazardous operation, as no one could assure himself that the intestines or other important tissues of the mother would escape injury. Dr. Tyler Smith suggests that chloroform might even here favor the relaxation of the os uteri, or of the rent. Gastrotomy, however, would seem to be preferable, provided manual delivery could not readily be accomplished.

If, however, the os be contracted, and especially if the opening in the walls of the uterus be partially or completely closed by the uterine contractions, version should not be attempted; it will be almost impossible to drag the child through the contracted rent, and the operation could seldom be completed without still more extensive lacerations. In all such cases, gastrotomy, with all its dangers, is decidedly preferable. This is now the general opinion of the profession, and is confirmed especially by the statistics as reported by Dr. Trask.

During the latter periods of gestation, delivery by the natural passages should never be attempted. The child and its appendages should be extracted by the operation of gastrotomy. Let the practitioner, however, be well satisfied of the truth of his diagnosis, for the necessary dangers of this operation are very great; and to expose the patient to the risk where no rupture actually existed, would be most unfortunate, if not reprehensible. Dr. Tyler Smith reports a case in London, where the peritoneum was opened, but where there was no rupture of the uterus.

In the early stages of gestation, the diagnosis is so uncertain, and the prospect of finding the embryo so trifling, that the operation for its removal cannot be justified. The practitioner must be contented to adopt measures to arrest the internal hemorrhage, to support the powers of his patient, in the first instance, and afterward to diminish inflammatory excitement.

The treatment after delivery, whether effected by the natural passages, or by gastrotomy, must be varied according to circumstances. The practitioner should facilitate as far as practicable the discharge of coagula, so as to diminish the danger from their putrefaction. The hand should be cautiously introduced to remove the placenta, whether it be in the uterus or among the intestines. The contractions of the uterine fibres should be induced, and great care taken that no portion of the bowel be strangulated by the contracted rent, or protrude into the vagina. The uterus should be pressed down into the hypogastric region, so that the edges of the lacerated part may be brought into contact as far as practicable.

During the state of prostration, stimuli internally

and externally should be freely administered. Practitioners unite in the praise of opium under these circumstances. Large doses should be at first administered; subsequently it may be given in smaller portions at regular intervals. When reaction has been established, stimuli should be abandoned; and occasionally antiphlogistic measures must be adopted to prevent inordinate inflammation, care being taken to preserve, as much as possible, the strength of the patient.

If the fœtus becomes encysted by adhesive inflammation, the woman should be subjected to a strict superintendence for a long period, for fear of an accession of inflammatory action, the formation of abscesses, etc. When abscesses form and discharge externally, the patient's strength must be supported, and every possible attention paid to hasten evacuation of the putrescent remains of the fœtus.

Such is an outline of the treatment of this dangerous complication of labor. Although often unavailing, its success is greater than could have been anticipated; being, as we have already mentioned from Dr. Trask's reports, as at least thirteen and a half per cent. more favorable when artificial delivery was resorted to; thus, twenty-three and a half women recovered when abandoned to nature's efforts, while thirty-seven recovered when the child was artificially removed, showing a gain of over fifty-seven per cent. in favor of operating.

As to the relative advantages of gastrotomy compared with other modes of delivery, it appears from the tables of the same gentleman that in cases of gastrotomy seventy-six per cent. recovered; and that where version, forceps, perforation, etc., were employed, only thirty-two per cent. were saved.

Reference to medical journals will show that, since the report of Dr. Trask, gastrotomy has often been successfully employed after ruptures of the uterus. Two such cases have occurred in Philadelphia, the one to Dr. John Neill and the other to Dr. William B. Page.

Much of the success of the operation depends upon its timely performance. According to Dr. Trask, in most of the favorable cases the operation was performed within five hours after the accident. When inflammation and fever have ensued, it ought not to be attempted. On the other hand, if the collapse be very great, no good could result from the operation, which would only hasten dissolution; the accoucheur must wait until some reaction, if possible, can be established.

It remains for future experience to throw more light on this interesting subject; but it is always to be borne

in mind that there are many cases in which delivery *per vias naturales* will be imperative, and many others to which gastrotomy is alone applicable.

LACERATION OF THE BLADDER.—This is occasionally the result of a rupture of the uterus or vagina—the rent commencing in one of these tissues may extend to the bladder. Lacerations of the lower portion of the vagina and bladder may also be the consequence of the unskilful employment of instruments, as the perforator, the crotchet, and even the lever or forceps. In all such cases, very deleterious consequences will result, if any of the urine escape into the areolar tissue, as its acridity will induce severe inflammation, and all its dangerous consequences, often involving the life of the patient. If all the urine, however, escapes externally, the patient will suffer less, and may recover with a vesico-vaginal fistula.

It more frequently happens that no immediate laceration of the bladder takes place; but that its tissues are so contused or otherwise injured that sloughing ensues after labor, destroying, more or less, the urethra or bladder. We have met with two cases, in which the lower segment of the bladder was thus completely destroyed.

The *treatment* in such cases must be palliative in the early stages; subsequently, if a fistula remain, it may be often relieved by a surgical operation.

Ruptures of the bladder, in very few instances, may take place even through its peritoneal surface; the urine, in such cases, being effused into the cavity of the peritoneum. Such accidents can hardly occur, unless the viscus has been enormously distended, and no proper attention to it been paid by the attendants. Dr. Ramsbotham informs us that two cases were seen by his father.

They may be regarded as necessarily fatal, owing to the intensity of the irritation excited in the peritoneum by the urine. The *treatment*, therefore, must be simply palliative. Dr. Ramsbotham very properly suggests that immediate delivery should be effected, that the child may not perish with its parent. Hence, the forceps, the blunt hook, or podalic version may be employed; or, if the os uteri be closed, the Cæsarean section may, according to some authorities, be justifiable.

Dr. Blundell has suggested that, if the bladder be ruptured, gastrotomy might be employed to evacuate the urine from the peritoneum, and thus afford some slight hope for the mother.

CHAPTER XXIII.

DYSTOCIA.—COMPLICATIONS FROM THE MOTHER.—ABORTION AND PREMATURE LABOR.

AMONG the other consequences of inordinate excitement of the uterus, during gestation, is the premature expulsion of its contents. Such expulsion may occur at any period of pregnancy. Systematic authors have divided these cases into two general heads: those which occur prior to the end of the sixth month, and those which occur during the last three months. This division is founded upon the fact that the child very seldom survives, if born before the seventh month. It is said, therefore, not to be "viable;" and the patient is said to "miscarry" or abort. This reason is, however, arbitrary, inasmuch as, in a few instances, the child has survived when brought forth at five and a half months, or even earlier; and, moreover, the fact that the child is or is not viable, has no influence whatever over the cause, the phenomena, or even the treatment of such premature expulsions.

Another reason given by Dr. Denman is equally arbitrary and unsatisfactory: he says that it should be called an abortion prior to the seventh month, because the hand of the practitioner cannot, on an emergency, be introduced into the uterus, the organ not being sufficiently developed.

The true foundation for a division lies in the condition of the ovum. This principle has been adopted by Guillemot, who subdivides abortions into ovular, within the first three weeks; embryonic to the end of the third month; and foetal to the end of the sixth month. It would be best, however, to disregard the state of the embryo, and to adopt as the foundation the condition of the ovum itself, which may be regarded as being formed of membranes alone, until the beginning or end of the fourth month, when a placenta is fully developed. The phenomena and the treatment of miscarriages are very much modified by this circumstance.

The proper division, therefore, of these accidents is into those which occur before the end of the fourth month, and those which happen subsequently. The former are proper *abortions*, the latter, *premature labors*.

ABORTION.

The *frequency* of abortions has been the subject of statistical investigation; but the result is very unsatisfactory, inasmuch as such statistics are founded upon reports from hospitals, into which comparatively but few women are admitted during the early stages of gestation. And, moreover, a large number of abortions are never reported to the physician, but are often passed over, as things of minor importance. Thus, Dr. Churchill states that the reports from French and English practice give one case of abortion out of about seventy-eight pregnancies, or a little more than one and a quarter per cent.; while Mr. Whitehead, of Manchester, states that out of eight thousand six hundred and eighty-one pregnancies, which happened to two thousand women, there were one thousand two hundred and twenty-two abortions under seven months; which is less than one in seven, or fourteen per cent. This, doubtless, approximates much nearer the truth. Mr. Whitehead also states, that out of six hundred and two cases, where the time of expulsion was known, thirty-five occurred at two months; two hundred and seventy-five at three months; one hundred and forty-seven at four months; thirty at five months; thirty-two at six months; fifty-five at seven months; and twenty-eight at eight months. Deducting from the above the eighty-three, which occurred after six months, we have five hundred and nineteen cases of abortion within six months; of these four hundred and sixty-seven occurred within four months, or nearly ninety per cent.; thus manifesting the far greater frequency of miscarriages before quickening, or during that period of pregnancy in which the uterus remains in the cavity of the pelvis.

There can be no doubt that this number would be still further augmented, if the number of miscarriages, which take place during the first four or six weeks of gestation, could be positively ascertained, as these are not infrequent, and are generally dismissed by the patient or practitioner as cases of menorrhagia or dysmenorrhœa.

The *expulsion of the ovum*, in the early stages of pregnancy, is effected by the contraction of the uterine fibres, producing, first, the dilatation of the internal os uteri and cervix, then, of the external os uteri, and, finally, the delivery of the ovum, precisely as during labor at the latter periods. Irritation or excitement of the uterine muscular tissue is the essential or proximate cause of abortion. The uterus, however, may, like other organs, be greatly irritated, and yet without exhibiting any muscular contraction. It is subject to congestion, to inflammation, and to other diseases, which may often exist for a long time, during pregnancy, without contraction of the fibres; and hence, without expulsion of the ovum. It is important, therefore, to distinguish between these two varieties of irritation; the one, affecting the circulation of blood in the uterus, and the other, its muscular fibres: the one, therefore, is termed "organic," and the other, "nervous irritation." The causes of abortion include all those, therefore, which produce nervous irritation.

They may be included under the two general divisions of *predisposing and exciting causes*, for the purpose of description: although, as will be seen, the predisposing will often act as the exciting causes; and the latter will very often induce abortion where no predisposition exists.

Exciting Causes.—These are innumerable, for anything which directly or indirectly excites the uterus may induce contraction of its fibres, and the expulsion of its contents. One series of these causes is the presence of a *dead ovum* in the cavity of the uterus; while living, it is a normal, healthy excitant to the uterus, increasing its organic action and its developments; but, when dead, this "action of gestation," as Mr. Burns expresses it, ceases. The embryo and its appendages act as a foreign body, inducing contraction of the muscular fibres, dilatation of the os uteri, and expulsion. The "action of contraction" supersedes the "action of gestation." Nervous irritation follows the suspension of organic irritation at very indefinite periods. The dead ovum is usually thrown off in the course of a few days or weeks; but, in other instances, it is retained for several months, even to the full period of utero-gestation—no putrefaction taking place, as no atmospheric air has been admitted. In cases of twins, both ova usually perish at the same time. This is not always the case, for, as formerly mentioned in speaking of superfœtation, one ovum may perish, and the other may survive and be developed, even to term; the "action of gestation" being maintained by the living embryo.

Still more wonderful cases are occasionally met with, perhaps by every accoucheur, in which the

embryo perishes, and yet the *membranes or placenta survive*. Ova, therefore, may be retained in a living condition for two or three months, and when expelled, will be found thickened, indurated, or otherwise altered in their texture; while the embryo will be very small, and, sometimes, cannot be detected. Professor Samuel Jackson and the author examined an ovum about three inches in diameter, containing two sets of membranes, and, of course, two amniotic cavities, and yet no embryo. When a placenta has been formed, various alterations may occur in its tissue, in consequence of hypertrophy, inflammation, or other morbid changes, continuing till the sixth, seventh, or even the ninth month of gestation; the embryo being exceedingly small, or entirely absent. When thrown off, these diseased placentæ present, usually, the appearance of a fleshy mass, being much thicker and more solid than the natural tissue; sometimes portions of it are ossified; in some there is a fatty degeneration of its tissues; while in others, it and the membranes are covered with a quantity of vesicular bodies, termed "hydatids." These and other morbid conditions of the placenta have been termed "*moles*," or "*false conceptions*." To the former name there can be no objection, as it simply expresses the fact that a preternatural fleshy mass has existed in and been discharged from the uterus. The other name is objectionable, as intimating that no conception has taken place. This is not true; for, in every instance, there is reason to believe that it is the result of a true conception or fecundation, but the tissues have become diseased, and the embryo has died. This observation is true, even of the hydatid variety, as it does not seem to have been proved that hydatids have ever existed in the uterus without being connected with an ovum; and it is doubtful, also, whether these bodies ever form attachments to the mucous membranes. These vesicles or hydatids are generally very numerous, and continue to accumulate sometimes for several months, until the uterus is thrown into contractions, by which they are expelled. The length of time during which these diseased placentæ or moles may be retained is indefinite. They are, perhaps, most frequently thrown off between the sixth and eighth months; but this process of expulsion is rarely delayed beyond the ninth month.

Authors speak of "*false*" or "*spurious moles*," and it is a popular belief that women may discharge moles where there has been no conception. The mistake has arisen from confounding coagula of blood, polypi, fungus growths, or even membranous or fibrinous matters, with true moles, from which they can easily be distinguished by the intelligent practitioner.

Dr. Bedford mentions a very extraordinary case of a married lady, forty-seven years of age, who had never borne any children, but who had a miscarriage in 1832. In the year 1848, the menses became irregular, recurring only every two or three months; the abdomen began to enlarge in the month of July, and continued to increase until the following April, causing great difficulty in evacuating both the rectum and bladder. When Dr. Bedford was called, the patient was excessively prostrated, and her life was despaired of. She had no labor pains, but suffered exceedingly from distension of the bladder. Fluctuation was perceived in the enlarged uterus, and a soft elastic tumor protruded through the os uteri, with very trifling adhesions to the cervix. Delivery of the mass was accomplished by the hand, carried into the uterus. This mass proved to consist of a quantity of solid matters, and three quarts of an oily fluid, which hardened on exposure to air. In addition, there was "a mass of human hair matted together." Dr. Bedford regarded the whole product as a singular example of a blighted ovum. The patient, although greatly relieved by the operation, was too much exhausted to recover, surviving her delivery only eighteen days.

It does not always happen that when the ovum perishes, it is discharged within the usual period of utero-gestation. There are a few cases upon record where the embryo has been *encysted* in its own membranes, and the whole ovum been retained, for many years, in the cavity of the uterus. In such cases, the membranes not having been ruptured, no atmospheric air has been admitted, and no putrefaction has occurred.

There are also cases where the ovum has been ruptured, and the embryo has escaped, but where there has been no evidence that the membranes or placenta had ever been discharged, either in their natural or putrescent condition; the possibility of a "*spontaneous absorption of the placenta*" is, therefore, maintained by good authorities.

The sources of these diseases of the ovum are very obscure. They have been sometimes traced to *diseases of the father*, and also to those of the *mother*. Smallpox, syphilis, scrofula, and other diseases of the parent, may infect the foetus.

Frequently, however, *the ovum is diseased* while the parents are healthy. The child's death is often caused by sanguineous effusions into the structure of the placenta, as well as by inflammations, or other degenerations of its tissues. The cord has been found atrophied, sometimes twisted, knotted, and entwined around the neck or body so firmly as to arrest the circulation. Rupture of the cord has also been met with. In other instances it is the embryo itself which is diseased; it

perishes, and often appears to be dissolved in the fluid of the amnion, as no vestige of its existence can be detected.

Another set of causes of abortion are termed "*accidental*" or "*mechanical*." They include falls, blows, jars, and violent straining efforts; also, inordinate pressure upon the uterus from feculent or gaseous accumulations, from ovarian, hepatic, or other abdominal swellings; from dropsical effusions; from great deformities of the bones of the pelvis, or spine; and also from tight dresses, corsets, or bandages around the body.

The *modus operandi* of these and similar mechanical agents has been debated. In the opinion of many, they operate by exciting uterine contraction, and thus detaching the membranes or the placenta from the internal surface of the uterus. Others, however, contend that the placenta and membranes may be detached directly by an external blow, without the intervention of uterine contraction; and some even contend that contusion of the foetus itself may be produced by a severe external injury to the mother. The question, perhaps, is of no great practical importance, as contractions of the uterus always supervene, before the os uteri is dilated, preparatory to the expulsion of the ovum.

Under this head of mechanical causes should be included the various operations already detailed for the production of abortion or premature labor, which, in a few specified instances, are advisable, when recommended by scientific and experienced practitioners, but which are altogether unjustifiable, and deserve the most serious reprobation, when executed for criminal purposes.

The third set of causes, and probably the most frequent, are those by which the uterus is irritated, *sympathetically*, by the disturbances of other organs. Such disturbances are general or local. Among the former, may be included all the cerebral and spinal irritations: such as powerful mental and moral affections, sudden frights, violent passions, inordinate sexual excitement, disgusting smells, tastes, and other impressions, operating through the mind or imagination of the patient. They also embrace disturbances of the vascular system: such as inordinate excitement of the heart and arteries, all the varieties of febrile affections, inflammatory, simple, or malignant, and especially the eruptive diseases, such as variola, scarlatina, rubeola, etc. It is a remarkable fact that, in the severe forms of febrile affections occurring during pregnancy, death seldom takes place without being preceded by the previous expulsion of the ovum, by which the prostration of the patient is augmented, and her death usually accelerated.

Among the *local affections* may be enumerated gastric and intestinal irritations arising from acrid ingesta, gaseous and feculent accumulations, or more severe forms of disease, such as vomiting, purging, dysentery, etc. In many patients, however, gestation will not be disturbed even when great tenesmus and bearing-down efforts are excited by dysenteric irritations. Drastic cathartics, which have been so frequently exhibited with a criminal intent to destroy the life of the embryo, although occasionally successful, frequently fail. Abortions are, also, often induced by the irritations from the distended bladder or rectum, from hemorrhoidal tumors, from inflammations and ulcerations of the vagina, of the cervix and os uteri, or from the body of the uterus. Simple congestions of the uterus are often productive of miscarriage, being followed by detachment of the membranes or the placenta, by the occurrence of hemorrhage, and, subsequently, by contractions of the organ. Such congestions may occur at any time during gestation, but are far more frequent every fourth week, or menstrual period, which, in many women, is often well marked. Hence, abortion, premature labor, and even labor at term, are apt to occur at the end of each lunar month! This is a fact of much practical importance.

Irritations of the uterus are frequently excited, also, by *displacements* of this organ. Hence, prolapsus, retroversion, and procidentia uteri are, in the opinion of the author, among the most frequent causes of abortion during the first four months of gestation. The uterus, when displaced, is continually irritated by pressure from the surrounding tissues, which irritation, especially in cases of retroversion, is daily augmented as this organ becomes developed, and its natural tendency to rise out of the cavity of the pelvis is impeded. We believe that such displacements are far more common than is generally supposed; and that their mal-influence explains the extraordinary fact, already mentioned, that ninety per cent. of all the abortions, during the first six months of gestation, occur prior to the end of the fourth month.

Displacements of the uterus will, in our opinion, explain why many women are liable, in successive pregnancies, to abort at the second or third month. Such accidents have attracted the attention of most practitioners, and have so often occurred without apparent cause, that it has been referred to a "morbid habit." Hence, such accidents are known by the expression of "habitual" or "periodic abortions." Many cases are upon record where the same woman has miscarried twelve or fifteen times in succession. One lady, who consulted the author, declared that her disappointments had been innumerable.

After careful attention to these cases, the author must believe that *habit* has very little to do with their production. They depend, in a large majority of cases, on retroversion of the uterus, and they may, therefore, be prevented, by removing the displacement before, or even after, fecundation has taken place. There can be no doubt, that many early abortions arise, also, from other causes, which have already been detailed; but we can hardly agree with M. Velpeau, in referring a majority of these accidents to a diseased condition of the ovum. It seems very improbable that a woman should habitually abort from a diseased ovum when her own health and that of her husband are good; especially, as our clinical experience teaches us that such "bad habits" can very generally be destroyed by suitable treatment. If the ovum had perished, a miscarriage could not be prevented.

Adhesions of the uterus to the tissues of the pelvis may, although not always, prevent its development and ascent, and thus become a cause of abortion.

Women occasionally become pregnant during *lactation*. When strong and healthy, the two processes of gestation and lactation may be continued, without injury to the mother or child, for several months. In delicate women, pregnancy is not well tolerated while they are nursing an infant. They become feeble, nervous, and, usually, the milk diminishes, and its quality deteriorates, to the manifest injury of the suckling infant. And even in strong mothers, after the seventh month, the child is apt to suffer if continued at the breast. The process of nursing has occasionally a reflex influence on the uterus, exciting pain in the back and uterine region, and occasionally is followed by uterine contractions and abortion.

Predisposing Causes.—Most of the exciting causes which have been enumerated may produce abortions in women who are healthy and vigorous; but there are many circumstances which render some women, or the same woman at different times, especially liable to these unfortunate accidents. Such predispositions are various, but perhaps may be included under the general expression of irritability or morbid excitability of the uterus and its appendages. When such irritable condition exists, even slight causes are followed by pain, and expulsive contractions.

The causes of irritable uterus are very numerous, and are either local or general. The *local* causes arise from ovarian excitements or diseases, from inflammations and ulcerations of the vagina and cervix uteri, from irritations of the bladder and rectum, and especially from displacements of the uterus, which constitute, therefore, one of the most frequent of the predisposing, as well as of the exciting causes of abortion.

The *general* causes depend upon the increased susceptibility or irritability of the cerebro-spinal nervous system. This often belongs to the original temperament or constitution of the woman; moreover, everything which exhausts the patient's strength, increases her nervousness. Thus, the loss of blood, continued vomiting, or purging, the loss of sleep, great and continued fatigue, watching, anxieties of mind, and the debility resulting from acute or chronic diseases, etc., all augment the excitabilities of the woman, and predispose to miscarriages.

A very opposite condition of the patient's system will, sometimes, render the uterus more irritable, and predispose it to premature action; thus, where there is great excitement of the heart and arteries, or where there is actual plethora, congestion of the pelvic organs may be induced to such an extent, that hemorrhages and uterine contractions will ensue, and the ovum will be lost. Such uterine congestions, during pregnancy, are, with many women, periodical—returning every fourth week—and are connected with the menstrual nîsus.

The presence of two or more children in the uterine cavity may, also, be considered as predisposing to similar accidents, by increasing the susceptibility of the uterus. Hence, women, pregnant with twins, are liable to premature labor, and even to abortion.

All the severe constitutional diseases, whether acute or chronic, which operate as exciting causes, may also be considered as predisposing to abortion. Impure atmosphere and epidemic influences have been numbered among the predisposing causes of abortion. Some maintain that an unusual rigidity of the uterus, especially of the cervix, rendering its development difficult, and also that tumors in the cavity, or in the walls of the uterus, may be the cause of premature expulsion. Others speak of inordinate relaxation of the tissues of the womb, as being equally injurious. It is very doubtful, however, whether either increased rigidity or relaxation of the uterus tends, in any way, to favor premature contraction.

The *modus operandi* of the causes of abortion, as already intimated, consists in producing uterine irritation; but these irritations may be simply *organic*, affecting the organic actions of the uterus, or they may be *nervous*, interesting its muscular contractions. Organic irritations will be followed by an increased determination of blood to the organ and a rapid development of its tissues, which determination, however, is often inordinate, producing congestion, and may be followed by expulsive efforts.

Nervous excitement, whether primary or secondary, produces contraction of the uterine fibres, dilatation of

the cervix and os uteri, separation of the membranes, with more or less hemorrhage, and the partial or total expulsion of the ovum.

Symptoms.—The *symptoms* of abortion are dependent upon organic and nervous irritation; the first are premonitory, and the second expulsive.

The *premonitory symptoms* may be summed up under the general expression of organic irritation of the uterus. They are, however, modified by the temperament and constitution of the individual, and more especially by the predisposing and exciting causes. From the enumeration of these causes, it will be seen that, in a great number of instances, an abortion is a secondary, and not a primary affection. It is very often simply a sequel or symptom of a morbid condition of the woman, or, at least, of the uterus. In such cases, an abortion is an aggravating circumstance in the history of the complaint, but not its original cause; the patient may even perish, not from the abortion, but from the original disease, expulsion of the ovum being merely accessory.

The premonitory signs, indicating organic irritation of the uterus, are well known, such as sensations of fulness, weight, pressure, a constant uneasiness or pain in the hypogastric region and lower part of the back, extending to the vulva and perineum, and along the limbs, often with dysuria, tenesmus, etc. These local symptoms sometimes exist alone, but frequently the person becomes nervous, with oppression about the stomach, heart, lungs, etc.; she has headache, nervous tremors, rigors, and other hysterical symptoms, and the circulation is often depressed; occasionally there is vascular reaction, and some febrile symptoms may be excited, even where no fever had previously existed.

All these symptoms may remain for a longer or shorter time, without injury to the ovum, and often subside, gestation being continued uninterruptedly. They are, however, in many instances, but the precursors of uterine contraction, which should be always anticipated, especially if any blood appears at the vulva. Where the embryo perishes, the premonitory signs often consist in a gradual, and sometimes in a sudden disappearance of the phenomena of gestation, sensations of fulness and weight about the pelvis diminish; nausea and vomiting cease; the patient recovers her appetite and powers of digestion; and the mammæ become more soft and flaccid. The general nervous symptoms are ameliorated, and the patient feels lighter, and more capable of exertion.

The *expulsive signs* sometimes appear without any of these premonitory indications, particularly when they are induced by falls, blows, or other mechanical causes. Frequently the first indication is a *red discharge* from the uterus, which, as it is due, in most

instances, at least to a partial separation of the membranes from the uterus, ought never to be neglected. A sanguineous discharge may be simply a menstrual effort, or may occasionally continue for a short time, and then disappear without any apparent injury. Examples of this kind are occasionally met with, returning at various intervals, sometimes until the full period of gestation. Hence, some women are said to menstruate or have periodic discharges of blood during pregnancy. This is unnatural, and should always be regarded as indicative of danger to the ovum.

If the hemorrhage be free, it always indicates detachment of a portion of the ovum, and, if profuse and accompanied with coagula, prognosticates its expulsion. There are, however, many cases in which hemorrhage is arrested and the ovum preserved. In such instances the flow of blood is stopped precisely as in cases of traumatic hemorrhage. When a portion of the membranes are separated the blood is effused from the ruptured utero-deciduous vessels, and descends between the membranes and uterus to the os externum uteri, and often collects and coagulates in the vagina. If the causes of detachment continue, the flow of blood will be increased; but if such causes be no longer operative, the blood in the vagina and in the os and cervix uteri will often coagulate, and the coagulum will extend in the canal, between the membranes and the uterus, to the bleeding vessels, forming, as in traumatic hemorrhage, an external coagulum, by which the flow is checked. Observation proves that very soon internal coagula are also formed in the uterine vessels, more effectually arresting the bleeding. If the embryo be preserved, these coagula will exist in the uterus until term, and the remains are often visible after delivery.

Alternate pains are the most decisive evidences of abortion, being indicative of muscular contraction. In a few instances they may disappear, but if once completely established, generally continue to increase until the uterus be emptied. These pains are precisely similar to those of labor at term, beginning moderately in the abdomen, back, and lower extremities, at long intervals, but gradually becoming more frequent and severe, and are soon accompanied with a disposition to strain or bear down. They have also similar effects, causing, first, a dilatation of the internal os uteri, of the cervix, then of the external os, and, finally, the expulsion of the embryo and its appendages.

Abortion, therefore, is a true labor. The two characteristic peculiarities are, first, that there is no placenta, but the whole membrana decidua is in close and vascular connection with the internal surface of the uterus. Hence, much hemorrhage may be expected when a portion merely of this membrane is detached;

while, in the latter periods of gestation, there is very little hemorrhage, unless the placenta be separated. The second peculiarity is the undilated condition of the cervix and internal os uteri; while, at term, these are dilated prior to the accession of labor. Hence, in a majority of cases, the first stage of abortion, or that of dilatation, is often very tedious. It results also from both these peculiarities, that hemorrhage begins early, is long continued, and is proportionally very copious; for it is manifest that each contraction of the uterus conduces to the further separation of the decidua, and every such separation, during the first as well as second stage of the process, is accompanied with a rupture of utero-deciduous vessels. Such contractions, therefore, are incompatible with the arrest of the hemorrhage, as they expel any coagula which may form, and continually augment the flooding by increasing the detachment of the membranes. After, however, the ovum is expelled, the contractions, by condensing the uterine fibres, close the orifices of the bleeding vessels, and thus arrest the hemorrhage, precisely as after delivery at term. The paradoxical assertion that uterine contractions increase hemorrhage, the ovum being present, and decrease hemorrhage, the ovum being expelled, is, therefore, easily understood. When abortion is threatened hemorrhage may be arrested, if no contractions be present, by the formation of coagula; if contractions supervene, hemorrhage will continue, unless the pains be completely arrested or the ovum be expelled.

Another symptom of abortion occasionally observed is a discharge of the amniotic liquid. This, however, is rare, as in a great number of cases the ovum is discharged entire; and in all instances the quantity of the amniotic fluid is so small that, when discharged, it escapes notice. It has sometimes occurred that the first symptom which excites suspicion of a miscarriage is the appearance of the embryo—the sac having been ruptured without much pain or hemorrhage, and its contents expelled—the patient regarding the attack as one of menstruation or of simple flooding.

Hemorrhage attended with alternate contractions and relaxations of the uterine tissues constitutes the characteristic signs of abortion. These phenomena, however, vary exceedingly, according to the period of gestation. When they occur at the third or fourth week after conception, they are comparatively moderate, seldom attract the notice of the physician, and are dismissed by the patient as a case of dysmenorrhea or menorrhagia. A satisfactory diagnosis, in such cases, can only be made by a careful examination of the discharges. The report of the patient or her nurse is not to be relied upon; the practitioner should carefully examine every coagulum—indeed, every cloth from the body of

the patient—to ascertain whether any proper membranous tissue or embryo be discharged. He should bear in mind, also, that if the embryo escape, the membranes may be retained, even for a long time, and may possibly give rise to subsequent mischief, by keeping up a hemorrhagic discharge with more or less pain; or, by putrefying in the cavity of the uterus, they may be productive of symptoms of a low or typhoid fever.

When the abortion occurs at the third or fourth month, the pains are often severe, and the hemorrhage great; large quantities of coagula are found in the vagina, and are suddenly discharged externally, to the alarm of the patient and her attendants. Such hemorrhages often continue for a long time, as each recurrent pain detaches still more of the decidua, rupturing the deciduous vessels, while the cervix and os uteri being imperfectly dilated, will not allow the escape of the ovum. Hence, much exhaustion, followed by frequent faintings, is not uncommon. Such discharges are seldom directly fatal; but they may injure the health of the patient, and they greatly aggravate the bad consequences of any existing disease. Abortion, therefore, is an unfortunate accident, in cases of fever, dysentery, etc.

Among the signs of abortion are the changes which are detected in the cervix and os uteri, by vaginal examination. During the existence of premonitory symptoms, where simple organic irritation is present, no change is perceptible on examination, unless it be an unusual fullness and turgescence of the pelvic viscera, and sometimes a greater descent of the uterus. If, however, nervous irritation or contraction has ensued, the neck of the uterus will be found developed at the upper part, owing to a dilatation of the internal os uteri, and the partial descent of the ovum into the canal of the cervix, so that the conical form of the lower portion of the uterus is considerably altered, becoming more spherical. Dr. Lee states that, in all such cases, expulsion will surely follow. This termination will be still more probable if, in addition, the os uteri be found partially dilated; and, especially, if a portion of the ovum be already projecting.

There are cases, however, especially in multiparous women, where the internal os remains contracted, but where the external is soft and somewhat patulous. In these instances, if alternate pains be not severe, there is more hope that the ovum may be retained.

As to the *general symptoms*, accompanying the expulsion of the ovum, they are, in the first place, similar to those from ordinary uterine irritation, and afterward are indicative of weakness or exhaustion, arising from the continuance of pain and the degree of hemorrhage. In most cases, therefore, they are temporary,

and no bad consequences ensue; the patient may even feel as well as usual. In some instances she is nervous and hysterical, and for the time being appears to be weak, and disposed to syncope. Attacks of faintness will frequently recur for several hours, often after the hemorrhage has been arrested; nevertheless, convalescence is rapid. Sometimes, especially in complicated cases, exhaustion is very great, from which the patient recovers slowly, and occasionally it terminates fatally.

Prognosis.—This must be exceedingly various, considering the different circumstances under which miscarriages occur. In a large majority of instances, where the women are healthy, the prognosis is very favorable, even when considerable quantities of blood are lost. If, however, the predisposing or exciting causes be of a serious character, the abortion aggravates the unfortunate condition of the patient, it may be to a dangerous extent. The practitioner's opinion, therefore, must be founded on the general condition of his patient, and the character of the exciting cause, more than upon the phenomena accompanying expulsion of the ovum.

In many cases, even of healthy women, the prognosis will be unfavorable, because the hemorrhage is persistent, from a retention of the whole ovum, or at least of its membranes, especially when these membranes become putrescent, or when, although the embryo is blighted, morbid degenerations of the membranes ensue, as has already been described.

Where the cause of abortion is originally ovular, and not directly connected with the condition of the mother, the symptoms of abortion are generally much less severe; as there is very little hemorrhage, and the uterine pains are moderate, slowly causing the dilatation of the cervix and os uteri, until the dead ovum is finally expelled. The woman usually recovers without difficulty, the local discharges being moderate and of short continuance.

Where abortion has been brought on by violence or surgical operations, it is the opinion of M. Cazcaux that it is very dangerous.

Diagnosis.—This must necessarily be very uncertain in all cases within the first four months of gestation. This uncertainty arises from the difficulty of determining positively the existence of pregnancy in its early stages. Hence, when pain or bloody discharges occur, it is difficult to determine whether it be menstruation or a threatened miscarriage. The usual points of discrimination are, that the menses, in a healthy condition, are fluid; if coagula appear, therefore, and the woman be married, it is a presumptive sign that an ovum is present, and its expulsion is threatened. This idea will be strengthened, if the pains return at regular intervals, and gradually become more severe, with in-

creasing hemorrhage. Menstruation is often without pain, even when the discharge is profuse; when pain occurs, it is irregular, often continues, even when severe, a few hours only, and is generally relieved by the continuance of the discharge. Still, however, the diagnosis is difficult, and can seldom be substantiated without careful examination of the discharges from the uterus.

The early or premonitory symptoms of abortion should always be distinguished from colic or other intestinal irritations, with which they may be confounded. This can generally be easily done by directing attention to the state of the alimentary canal, also to the locality and character of the pains, and by ascertaining the state of the uterus and the abdomen by external and internal examinations.

Treatment.—The treatment of abortion, during the first four months of gestation, is a subject of great interest and importance, not merely as regards the welfare of the woman, but that of the embryo, which always perishes, if the process be not arrested. That the life of a human being is destroyed, in every case of miscarriage, is a circumstance, the gravity of which has, often, not been sufficiently estimated, either by the patient or her medical superintendent.

In the management of these cases, attention must be directed,

First. To the prevention of such accidents; and,

Second. To the proper management of the process of expulsion.

First. *Prevention of Abortion.*—As uterine irritation is the essential or proximate cause of miscarriages, the simple indication is to prevent or moderate all inordinate excitement of the uterus. This is most effectually accomplished by obviating the influences, as far as practicable, of the predisposing and exciting causes of these accidents.

The *local predispositions*, as already enumerated, arise from various states of the pelvic viscera. Hence, all irritations from the bladder and rectum should be carefully obviated. Any inflammatory affections of the vulva, vagina, cervix, or body of the uterus, demand a special attention, as by their severity they may act, not only as predisposing, but also as exciting causes. It has been stated that displacements of the uterus are the most common of these predisposing influences. If, therefore, they exist before conception, they should be obviated by appropriate measures, especially by the use of pessaries. (Fig. 99, on page 416.) If such displacements exist after fecundation, the same indication should be fulfilled by similar measures. When speaking of labor complicated with displacements of the uterus, we stated our opinions and practice as to the manage-

ment of these accidents during pregnancy, and we would now simply reiterate the declaration, that a large proportion of those cases of abortion, which occur about the second or third month of gestation, may, in our opinion, be prevented, if the natural position of the uterus be maintained for three or four months by judicious treatment, including the use of pessaries. The irritability of the uterus is thus diminished, and not increased; the sources of irritation are lessened; and the disposition to inordinate nervous excitement and vascular congestion is often effectually prevented. The "bad habit," to which many of these accidents has been referred, may, also, in these instances, be effectually counteracted.

In the management of those predisposing causes, dependent upon the *woman's temperament or constitution*, or upon the presence of any acute or chronic disease, much judgment and experience are demanded. If she be in an asthenic or anæmic condition, her strength must be restored by nutritious diet, tonics, fresh air, exercise, bathing, etc., so far as is compatible with her situation. By such measures, her digestive and nutritive functions can be improved, her blood will become richer, and hence, her strength will be increased, and her irritability will be diminished. This is all-important, inasmuch as a large number of abortions arise, not so much from the severity of the exciting cause, as from the morbid irritability of the patient's system, and especially of the organs of the pelvis.

If, on the contrary, she be plethoric, and especially if there be any indications of uterine congestion, the loss of blood, and other depletory measures, will be essential to the preservation of the ovum.

In the management of any *acute or chronic diseases*, which may exist during pregnancy, the ordinary remedies are applicable. The practitioner should bear in mind that, in all the sthenic forms of disease, pregnant women will bear free evacuations; and, in the asthenic forms, their irritability is greater than in the unimpregnated state, demanding more frequent exhibition of antispasmodics and narcotics. In all these cases, the occurrence of abortion should be carefully obviated by suitable measures, as such accidents, under these circumstances, are very serious. M. Cazeaux and other experienced writers affirm that, in cases of syphilis, a moderate mercurial course is not injurious to the pregnant woman.

As regards the *exciting causes*, few directions can be given. Their character should be carefully examined, and their influences, as far as practicable, be obviated by appropriate measures.

If, by any symptoms, it can be positively ascer-

tained that the ovum is *blighted*, no attempt should be made to prevent the occurrence of abortion. Regular uterine pains should be encouraged rather than diminished.

The bad effects of *pressure*, whether external, as from tight dresses, corsets, etc., or internal, from distensions of the bladder, rectum, abdomen, etc., can often be relieved, or, at any rate, palliated. When the uterus is very sensitive, and especially when actual pain or irritation exists, the patient must be strictly confined to the recumbent position, in order to escape even the ordinary pressure from the weight of the intestines, or the contraction of the abdominal muscles. This rule, at all times important, is still more essential when there is any inordinate pressure from dropsics or abdominal tumors.

All irregular and unnatural pressure, arising from any displacement of the uterus, should be diminished by confinement to bed, or else by suitable pessaries, care being taken that no irritation be produced by the size, form, or improper employment of these instruments. To prevent any undue uterine excitement, sexual intercourse should be carefully avoided for weeks and months, wherever there is any predisposition to abortion. Indeed, all excitements, mental, moral, or physical, demand the greatest possible precaution, so as to prevent a direct or reflex influence upon the uterus and its appendages.

In cases where a *lactescent* woman becomes pregnant, as a general rule, weaning should be recommended, for reasons already detailed. Nevertheless, such weaning should be gradual, not sudden; and it will be best, in most cases, for a wet-nurse to be provided for the infant thus prematurely deprived of its natural nourishment. We have known many unfortunate cases, where children have perished from sudden and premature removal from the mother's breast under these circumstances.

Uterine irritation, threatening abortion, may be diminished, not merely by removing its causes, but, also, by *direct measures*. The great importance of rest has already been mentioned: this, to be effectual, should be absolute. The woman should be undressed, and kept in bed; even a sitting posture should be prohibited, and also all straining effort to evacuate the bladder or rectum. If there be any evidences of plethora or local congestion, bleeding is often advisable, and is very efficient. Sometimes, cups or leeches may be substituted for the lancet. Mild laxatives, and also diaphoretics are generally necessary. Great attention should be paid to equalize the circulation, preventing any undue determination to the head, and encouraging the capillary excitement of the hands, feet, etc.

Hence, cold applications to the head, and "dry heat" to the extremities, are important, occasionally assisted by rubefacients and other revulsives, excepting, perhaps, cantharides, which, by producing irritation to the bladder or rectum, would also disturb the uterus.

By these measures, uterine irritation and congestion are often relieved; and even if hemorrhage has appeared, it may cease, and the process of gestation be continued. Many practitioners have recommended cold applications and even ice to the region of the pelvis. This practice should be reserved to the more severe cases of hemorrhage, where all hope of preserving the ovum is abandoned. Such applications not unfrequently induce, rather than restrain, muscular action. The same observation may be made respecting the internal use of cold water, either to the stomach, rectum, or vagina. All drinks should be neither very hot nor cold; and the diet should be moderate, sufficient to sustain the strength of the patient, without producing any vascular excitement.

Narcotics, however, are exceedingly important in all cases of threatened abortion, as they powerfully contribute to suspend pain, whether organic or nervous, and thus to prevent or relieve congestion. It is generally best to administer them per rectum, and in full doses.

The measures now recommended should be employed, even when many symptoms are present threatening the expulsion of the ovum; for it is impossible to decide positively, in the early stages, whether the process can or can not be arrested. The fetus has often been preserved, even when there has been severe hemorrhage and contractile pains; although, under these circumstances, expulsion generally results. This unfortunate event becomes inevitable when the membranes have been ruptured.

Second. Management of the Expulsive Stage.—If it be positively ascertained that the ovum is blighted, that the liquor amnii is evacuated, that the hemorrhage is profuse, and regular alternate pains are established, and, especially, if the measures for prevention have been inefficient, the practitioner should favor, not retard, the expulsive process; and, at the same time, render it as easy and safe as practicable.

The uterine pains are now useful; but they may be occasionally moderated, if severe, by the use of opium in small doses, especially in hysterical cases, or where the woman is much exhausted.

Uterine contractions, however, are often deficient; hence, the process of expulsion is delayed, while the hemorrhage is profuse, and may endanger the safety of the patient. M. Velpeau records a fatal case of abortion from hemorrhage. Contractions, therefore,

may be augmented by the exhibition of cold drinks, and also of stimuli. Hence, brandy and other alcoholic beverages are useful; but more dependence is to be placed on the employment of ergot, which is very universally recommended. Some say, advantage may be derived from the administration of eanella, either in the form of tincture or powder. The German accoucheurs have confidence in borax, either alone or combined with the *secale cornutum*. Uterine contractions can also be accelerated by stimulating injections into the rectum, and by cold to the abdomen, or even to the vagina.

Distension of the vagina by the plug, also stimulates uterine contractions. Mr. Barnes and Professor Simpson recommend dilating the os uteri: the former, by means of gum-elastic tubes or bags, to be introduced in a collapsed state, and then enlarged by the injection of air or water. The latter employs sponge tents.

Expulsion of the ovum may also be indirectly facilitated by relaxing the cervix and os, especially by the local application of belladonna ointment.

The *hemorrhage*, except in cases where the embryo has perished, is generally profuse, and often demands prompt attention, to prevent syncope, or even exhaustion. In such cases, cloths, wet with cold vinegar and water, or enclosing portions of ice, may be applied to the pudendum, and also to the hypogastric region; while dry heat, rubefacients, and other revulsives should be employed to maintain the heat of the extremities. Cold is very efficient in diminishing the hemorrhage, and will not now be injurious by increasing uterine contractions. Cold injections into the rectum or into the vagina are occasionally admissible; and, if the case be urgent, pieces of ice enveloped in a cloth may be introduced into the vagina.

The most efficient mode, however, to arrest hemorrhage, is by the use of the "plug" or "tampon." This consists in introducing portions of lint, sponge, wool, cotton, or strips of linen, etc., within the vagina, so as to arrest, to a certain extent, the blood in this canal; thus facilitating its coagulation, which will, very generally, be followed by the arrest and coagulation of the blood in the cervix and cavity of the uterus, and the cessation of bleeding often for hours. If the pain continues, hemorrhage will partially return; but, if the tampon be continued or repeated, the flow is usually moderate until the expulsion of the membranes is fully accomplished, when it ceases, as after ordinary cases of labor. The value of the tampon is very great; the life of the mother being, apparently, often preserved through its instrumentality. There can be no serious objections against its use, as the uterus is too small, and its tissues are too dense, to allow any quantity of

blood to accumulate within its cavity; and any local irritation of the vagina that may be excited is trifling, and soon vanishes.

Practitioners, in speculating upon the uses of the tampon, generally believe that it excites the contractile powers of the uterus; and, hence, they do not recommend its employment, except when all hope of preserving the embryo is abandoned. There may be some truth in this observation when much pressure is made on the os and cervix uteri, as most practitioners advise that the vagina be well filled with pieces of linen, and the whole be secured by a compress and bandage over the vulva; or, as has been still more recently suggested, to distend the whole vaginal tube by a gum-elastic bag, filled with air or water. All such powerful pressure must, necessarily, irritate the uterus, and will bring on its contractions. Our experience would indicate that such plugging of the vagina is altogether unnecessary with a view to arrest hemorrhage. We have found, almost invariably, that if one or two pieces of sponge, as recommended by Dr. Dewees, be introduced, the hemorrhage will be effectually arrested, and no pressure or uterine excitement will be induced; and we unite, therefore, with MM. Cazeaux and Velpeau in saying that gestation may continue even after the tampon has been used.

Coagulation of the blood in the uterus generally occurs rapidly after the use of the sponge; hence, it may be removed at the expiration of eight or twelve hours. This becomes necessary, as decomposition of the fluids very soon ensues, rendering the whole mass offensive and irritating. Should the bleeding recur, fresh pieces of sponge may afterward be introduced.

Many practitioners place great confidence in astringents internally administered. Dr. Dewees recommends, very strongly, the acetate of lead, generally in combination with opium. Dr. Meigs speaks of alum and nutmeg as advantageous. We acknowledge, however, with Dr. Ramsbotham, that, neither theoretically nor practically, can we discern any reason for their employment.

Hemorrhage, although it may be temporarily arrested by the above measures, yet will continue more or less profuse, until the whole ovum be discharged. Cases occur where the ovum is retained, either because the contractions are too feeble, or because the cervix and os uteri are not sufficiently dilated. If there be slight hemorrhage, and the strength of the patient good, no interference is proper. If, however, there be much hemorrhage, and the patient weak, the uterine actions may be stimulated by ergot, eanella alba, etc., or by the application of cold to the abdomen, rectum, etc. It is, in such cases, that dilatation of the os uteri

by sponge tents has been proposed by Dr. Simpson as more efficient in exciting the uterus and arresting the hemorrhage, than the tampon in the vagina. The practice, however, is not free from danger, and should be reserved for extreme cases. All practical authors condemn puncturing the ovum in these early stages, as very little is gained by the operation: hemorrhage is apt to continue, and it renders the delivery of the membranes much more difficult.

Should the hemorrhage be profuse, and the os and cervix be partially dilated, the finger may occasionally be introduced, so as to hook out the whole ovum. This is a difficult and painful operation, owing to the small size of the uterus. Decided preference should be given, in our opinion, to the use of instruments. These have been generally condemned as productive of more mischief than benefit. The objection applies, however, more to the kind of instrument employed than to the operation. Dr. Dewees' wire

Fig. 103.



Dewees' Wire Crotchet.

crotchet is, we think, too small, and it cannot always be well determined whether the hook be implanted in the ovum or in the tissues of the uterus. We acknowledge that we have always had a feeling of relief when the instrument has been withdrawn without injuring the patient. We prefer, therefore, the abortion forceps, originally recommended by Levret; or, better still, those represented in Plate XV., Figs. 85 and 86. These the author has had constructed on the principle of Dr. Everett's "bullet-forceps;" they should be smaller than those employed in cases of retained placenta. The blades are so arranged that they may present the form of a lever, allowing their easy introduction through the cervix into the uterus, exterior to the ovum. One blade can then be revolved, slowly, on the other, so as to assume the form of a forceps, embracing the ovum, which can then be gently withdrawn. In an interesting case, where profuse hemorrhage continued to recur for several days, and where the ovum, unbroken, was movable in the uterine cavity, this body was readily removed by the forceps, without pain, and followed by the arrest of the bleeding. In another instance, where the ovum had been retained for several days, its extraction was accomplished by the author, by a small lever which is here represented. Dugés has recommended that a piece of wire be doubled, as a loop, and then curved, which would act as a hook or lever. Dr. Churchill proposes a treble spring crotchet, the

shank of which is passed into a canula, so that the claws can be closed or opened by means of the canula;

Fig. 104.



Hodge's Lever and Crotchet.

the whole instrument resembling some of those suggested by Civiale for the operation of lithotripsy.

Should the ovum, unfortunately, be ruptured, the difficulty of extraction becomes greater. It certainly ought not to be attempted by manual or instrumental measures, if there be little or no bleeding, especially as the os and cervix uteri generally contract, and the membranes are closely adherent. The practitioner may, in such cases, patiently wait for the occurrence of uterine contractions. Even if a part of the ovum can be felt, no attempts should be made to extract it, as hemorrhage may be excited. If a portion be projecting, and the hemorrhage great, its descent may be facilitated by one or two fingers in the vagina, provided the *secale cornutum*, cold, etc., have proved inefficient. In such cases, Dr. Dewees recommends, also, the wire crotchet; and it may be proper occasionally to resort to the abortion forceps or lever. All such artificial assistance is, however, very seldom demanded; the hemorrhage can generally be arrested by the tampon, and the ovum be safely expelled.

Should it be retained, and putrefaction ensue, fre-

quent vaginal injections are important to remove putrescent matters, and occasionally warm water may be thrown into the uterus. If the patient's health should suffer from the absorption of putrid matters, more decisive means may be adopted for emptying the uterus.

The treatment of *moles*, or false conceptions, resulting from the development and degeneration of the placenta, after the embryo has perished, must be governed by the peculiar circumstances of the case. No positive diagnosis can be made until symptoms of labor are observed, and the os uteri is at least partially dilated. The practitioner should then encourage the contractile powers of the uterus, and occasionally may hasten the delivery of the mole, whether it be vesicular or solid, by the employment of medical or of surgical measures, as recommended for the extraction of retained placenta.

In all "true moles," the uterus being emptied, the treatment should be similar to that after ordinary cases of delivery.

The treatment of the general system of the patient, during the expulsive stage of abortion, must vary, according to circumstances. Occasionally, where there is great plethora and strength, some evacuating remedies may still be proper; generally, however, owing to the loss of blood, and the severity of the pain, the patient is exhausted, and often, frequent returns of faintness demand the free exhibition of stimuli. The preparations of opium are here exceedingly valuable, not simply by diminishing pain, but also by relieving nervous and hysterical symptoms, and promoting a disposition to reaction. Alcoholic drinks are also important.

After the uterus is empty, and no peculiar complication exists, the woman generally recovers rapidly. She should, however, be kept quiet, upon moderate regimen, and without stimulants, for fear of subsequent irritation, or inflammatory disturbances. In many instances, the confinement to bed must be prolonged, and measures adopted for the removal of any predisposing cause of abortion, which may be still present. This observation applies especially to those cases connected with displacements of the uterus; and also where there are inflammations of the vagina or cervix uteri.

If, after the expulsion of the ovum, the patient should remain anæmic and exhausted, much attention must be paid to restore her strength, and she should, for several months at least, live *absque marito*.

In regard to the *prevention of abortion*, the young practitioner should remember that the most trifling excitement, in very irritable women, may bring on an abortion. Hence, in some women, the recumbent position becomes absolutely necessary, not merely for four

months, but even for the whole period of utero-gestation; as the mere weight of the intestines, or a slight straining effort, may inordinately excite the uterus: while, at the same time, all suitable measures should be adopted to diminish this nervous excitability. Where there is much plethora, with a disposition to local congestion, the use of the lancet, and other evacuating remedies, are among the important agents for the prevention of abortion.

PREMATURE LABOR.

This includes all cases where the contents of the uterus are expelled after the fourth month, when the placenta is fully formed, until term.

As to the *frequency* of such accidents no accurate details can be given. Mr. Whitehead, however, states, as formerly mentioned, that out of six hundred and two cases under eight months, four hundred and sixty-seven occurred before quickening, sixty-two between four and six months, inclusive; and eighty-three from seven months to the commencement of the ninth. Perhaps this will afford a general idea as to the relative frequency of these accidents, subject, however, to numerous variations.

The *causes* of premature labor, both predisposing and exciting, are similar to those causing abortion, with a few important exceptions. One of these is, that the uterus, having risen out of the pelvis, is no longer subjected to those innumerable irritations which are connected with its location in the pelvic cavity, especially those dependent on prolapsus, retroversio vel procidentia uteri. Another exception is the greater liability for the ovum or the embryo to be blighted during the early stages of pregnancy; for, although the fœtus often becomes diseased and dies, after quickening, and although the placenta is subject to various morbid lesions, yet such accidents are less frequent than at the commencement of gestation.

The indications of the death of the fœtus, after the fourth month, are much more decided than prior to that event. The cessation of motion, the sensation of a body falling from one part of the uterus to the other, the decrease of the abdominal protuberance, but especially the disappearance of the cardiac sounds and the placental murmur, are very positive signs that the fœtus has perished. This inference is sometimes confirmed by the swelling of the breasts and the formation of milk; while the patient, being free from nausea, vomiting, nervous and vascular excitations, often feels very well, and can attend to her usual avocations with comfort and alacrity. In other instances, especially where her general health had been previously bad, or when

actual disease is present, or where her mental or moral feelings are disturbed because her infant is dead, she continues to suffer until the uterus be emptied, or until her general health be restored.

No bad consequences, however, result from the presence of a dead foetus in utero. It is very often carried many weeks, or even to term, without exciting any local or general irritation. No atmospheric air being admitted into the uterus, there is no decomposition of any portion of the ovum; the child does not putrefy, as has been too frequently asserted by many practical authors: it is simply macerated, so that its tissues become soft, the bones of the cranium very movable, readily overlapping each other, while the skin assumes a dark, purplish color, and the cuticle separates easily from the cutis vera. Dr. Simpson mentions an extraordinary case where even the base of the cranium was so disintegrated that the child, at seven or eight months, was spontaneously delivered through a contracted pelvis measuring not more than half an inch in the transverse diameter of the inferior strait.

When the child perishes and the "action of gestation" ceases, the "action of expulsion" will, sooner or later, ensue, doubtless, according to the peculiar susceptibilities of the patient; occasionally it occurs in a few days, but sometimes is delayed for weeks or months.

This delay is not unfrequent where the child alone perishes, and the vitality of the placenta continues, degenerating in its character, so as to constitute, as already mentioned, fleshy or vesicular masses, termed "moles" or "false conceptions."

Delays also result where, although one whole ovum perishes, gestation is kept up by the presence of a second child in the uterus.

The *symptoms* of premature labor differ very slightly from those characterizing *labor at term*. The first stage of labor is, however, more protracted, inasmuch as the cervix uteri has not been developed in a large majority of cases. Hence, time is required to effect the dilatation of the upper portion of the cervix as well as of the os uteri. This process of dilatation will occur more readily as gestation is further advanced.

On the contrary, the second stage of labor is more rapid; for the os uteri, being dilated, the child passes readily, as it is of smaller size and as the bones of the cranium are imperfectly ossified, and the whole head more compressible.

Delays, however, may occur from various causes, and especially from mal-presentations, as these are more frequent in premature births. Thus, according to M. Cazeaux, Dubois reports that out of one hundred and

sixty-nine premature births, one hundred and thirty-three were cephalic presentations, thirty-two pelvic, and four shoulder; that is, the cephalic presentations were nearly seventy-nine per cent., the pelvic nearly twenty per cent., and the shoulder presentations rather more than one per cent. It is interesting to observe that of the above number, ninety-six were still-born, and seventy-three living. Of the former the head presented seventy-two times, the pelvis twenty-two, and the shoulder twice; of the latter or living children sixty-one were cephalic, ten breech, and two shoulder. Hence, in premature labors the pelvis presents more frequently than at term, and also when the child is dead than when it is alive—say in the proportion of about twenty-three to fourteen.

The third stage of labor is generally short, the placenta being easily detached and thrown off soon after the child is expelled; occasionally, however, retention of this body occurs, demanding the ordinary treatment for retained placenta.

Premature labor *differs from abortion*, inasmuch as there is a proper placenta, and the dense and vascular character of the membrana decidua has greatly diminished,—this membrane becoming very delicate, almost like areolar tissue between the chorion and the internal surface of the uterus, except where the placenta is adherent. There is also proportionally a large quantity of the liquor amnii. In premature labor, therefore, the bag of waters forms at the orifice of the uterus, and when ruptured, there is a free discharge of liquor amnii—such discharge being very trifling in cases of early abortion.

But the great peculiarity in labor after the fourth month, is the infrequency of hemorrhage. An abortion is universally attended with much loss of blood, from vascularity of the membrana decidua, and the extent of its attachments, so that separation of any portion of the ovum must be followed by bleeding, unless it be blighted. After the fourth month, however, no hemorrhage ensues from the detachment of the decidua; but it occurs only when the placenta is separated, partially or completely, which is a comparatively rare accident.

The peculiar circumstances attending on uterine hemorrhage, from the detachment of the placenta, and the treatment demanded, are so important, whether such detachment occurs prior to term, or during labor, that they deserve a separate consideration. (Chapter XXIV.)

The *prognosis* of premature labor, as regards the mother, is generally favorable, provided this process has been excited by causes which do not involve the integrity of the tissues, or the general health of the

mother. Where, however, there has been any severe accident, or where the mother is the subject of acute or chronic diseases, the occurrence of labor is an unfortunate circumstance, generally aggravating the disease, exhausting her strength, and hastening a fatal termination.

Premature labor may also be of serious import when complicated with severe hemorrhage or any other accidental circumstance.

As regards the child, the prognosis is the more unfavorable when labor occurs in the early than in the latter months. The foetus very generally perishes if born prior to the seventh month, although to this there are some exceptions. It frequently survives when delivered at the seventh month, and still more frequently as gestation is prolonged. There is no foundation for the popular notion that a "seven months" child is more likely to live than one born at the eighth; neither is it true, that if a child survive, when delivered at the sixth or seventh month, it will be puny or delicate. On the contrary, the fact of its living, when born prematurely, before its intra-uterine life has been perfected, indicates a vigorous constitution. Such children we have often known to be remarkably healthy, and subsequently to be well developed.

The *treatment* of premature labor demands, therefore, no special attention. The first stage of labor being tedious, the practitioner should wait patiently for the unfolding of the cervix and the dilatation of the os uteri, counteracting any mal-influences from the predisposing or exciting causes which may be still influential. It is seldom proper to rupture the membranes, as they facilitate the dilatation of the cervix, and, by preserving the liquor amnii, contribute greatly to the safety of the foetus. If the waters be evacuated, the infant is immediately exposed to powerful pressure, and if not speedily delivered, will often perish.

During the second stage of labor, artificial assistance is very rarely demanded, even if the presentation or position be unfavorable; the child being small and compressible, its tissues are readily moulded to the form of the passages, so that expulsion is seldom delayed. This is often true even in trunk presentations, where spontaneous version or evolution is more frequently observed than at the full period of gestation.

During the third stage, it may be occasionally requisite to assist in the removal of the placenta; but very seldom, if ever, by the introduction of the hand into the uterus. Neither can much traction be made on the cord, as it readily ruptures.

CHAPTER XXIV.

DYSTOCIA.—COMPLICATIONS FROM THE MOTHER.—UTERINE HEMORRHAGE.

ALTHOUGH more or less blood is lost in every case of labor, yet, occasionally, this loss is so profuse, as most seriously to endanger the life of the parturient woman, and to demand all the aid that science and experience can possibly afford. Much attention, therefore, has been paid by authors to this subject, which has, by their efforts, been greatly elucidated, although there are still important points on which professional opinions are divided. We shall endeavor to present a summary of the facts and opinions which, at this time, influence the professional mind, as a full investigation will demand more space than our limits will permit.

Uterine hemorrhage, when severe, is usually denominated "flooding," and may be observed during any period of pregnancy, and also during and after labor.

When this accident occurs, prior to the formation of the placenta, there are some attendant circumstances of importance, which have already been noticed, when treating of abortions. The present observations, therefore, will be restricted to hemorrhage during the latter period of gestation, and to hemorrhage before and after labor; in all which cases it will be found connected with partial or complete separation of the placenta; for after the fifth month, the utero-deciduous vessels are so small, that their rupture is of trifling importance. The slight effusion of blood, in such cases, is termed a "show;" this, in itself, is not injurious, but should not be neglected, as it indicates a detachment of the membranes, which may be followed by labor.

Detachment of the placenta, on the contrary, indicates that there is an exposure of the large venous sinuses opposite to the placenta, from which the blood may be rapidly effused, sometimes causing speedy death. This separation, therefore, is the proximate or essential cause of uterine hemorrhage, and may occur before or after the commencement of the parturient process.

UTERINE HEMORRHAGE DURING GESTATION.

From what has been already detailed, as to the *causes* of premature labor, it will be evident that they are equally operative in effecting a detachment of the placenta, and a consequent effusion of blood. It seems to be generally admitted that uterine contractions are always necessary to effect detachment of the placenta. Certainly this is true in a very large majority of cases; yet it is also true, that such contractions are not always evident, either to the patient or practitioner; the first indication of danger being frequently moderate, or, it may be, profuse bleeding from the vagina. It is contended also, that a severe blow upon the abdomen may at once detach the placenta mechanically; and even, says Cazeaux, may contuse the infant. In cases also of great congestion of the uterine vessels, it is believed that blood will be effused exterior to the placenta, causing its detachment, without any prior contraction of the uterine fibres. There can be no doubt, also, that such effusion may, in a few instances, gradually augment, still further separating the placenta, where even the tonic contractions of the womb are so inefficient, or so completely suspended, that the uterine tissue yields, and becomes distended from the collection of blood between the placenta and uterus.

These may be regarded as exceptions; for the general principle should be received, that the contraction of the uterine fibres, whenever excited by mental or physical causes, is the agent by which detachment of the placenta, and the consequent hemorrhage, are produced.

The *phenomena* and *dangers* of hemorrhage are modified by the location of the placenta. Although usually attached to the body or fundus of the uterus, it is occasionally implanted on the cervix or os uteri, in which case, portions of it will be necessarily separated as the cervix is developed, or, as the internal or external os uteri is dilated. This necessary separation, involving, of course, not merely the rupture of the utero-placental vessels, but also the exposure of the orifices of the uterine sinuses, will be followed by bleeding. As dilatation, therefore, of the internal or external os during pregnancy and delivery cannot

be prevented, it follows that hemorrhage must ensue, sooner or later, when the placenta is affixed at the cervix uteri. Dr. Rigby, therefore, in his excellent essay, has designated all such hemorrhages as "unavoidable;" while those which result when the placenta is attached to the upper portions of the womb he terms "accidental hemorrhages." These expressions are now generally employed, and will serve to indicate the two grand divisions of uterine flooding.

ACCIDENTAL HEMORRHAGE.—The *degree* of hemorrhage will depend on various circumstances. It is usually profuse, when the patient's system is very plethoric, and where there is great uterine congestion; and as this is usually augmented every fourth week, floodings are more frequently observed during the menstrual nixus, or, at least, are more profuse at such periods. The degree of hemorrhage depends also on the severity of the exciting cause, upon the continuance and strength of the uterine contractions; but especially upon the extent to which the placenta is detached. When there is a slight separation, the hemorrhage is generally moderate, and may be arrested; but when greater, it is more profuse and dangerous. Bleedings, after the fourth, and prior to the seventh month, are seldom very injurious to the mother; during the last three months, they are often of a serious character.

The *symptoms* of accidental hemorrhage are usually, but not always, very decided. If any profuse discharge of blood occurs during pregnancy, it is right to infer a detachment of the placenta. A vaginal examination, however, becomes necessary to ascertain whether such hemorrhage comes from the vagina, the os or cervix uteri, from ulcers, from polypi, from cancerous or other tumors; or whether from an implantation of the placenta over the cervix uteri.

It should also be ascertained whether the hemorrhage be accompanied with uterine contractions; if these exist, the bleeding will generally be increased during their presence, and intermitted during their cessation. Very generally, large coagula are formed in the vagina if the patient be in a recumbent position.

It occasionally happens, fortunately very rarely, that hemorrhage exists, but there is no external manifestation of its occurrence. The blood is effused on the surface of the placenta, but does not escape; it collects even in large quantities between the placenta and membranes and the internal surface of the uterus, constituting, therefore, what has been termed "*occult hemorrhage*." That such accidents may occasionally ensue, there can be little doubt, although, *à priori*, it would seem to be very improbable, as the uterus is a

plenum. The whole cavity is occupied by the ovum distended by the liquor amnii, an incompressible fluid; while the tissue of the uterus is generally dense, and so abundantly supplied with irritable muscular fibres, that its dilatation could hardly have been anticipated. Experience proves, however, that, in some instances, the uterine walls yield at the place of effusion, so as to form a prominence externally. The blood is thus effused sometimes to such an extent as to prove fatal.

The diagnosis of this occult hemorrhage is, of course, difficult, and patients, indeed, have perished from this cause, the character of which had not been suspected. If, however, there be uneasy sensations, sometimes amounting to pain in the uterus, and if, by careful examination, this organ should be found irregular in its form, with a marked prominence, of a soft, although firm, character, and if evidences of general weakness and exhaustion should appear, without any other reason, it may be inferred that hemorrhage exists in the uterus, although there be no vaginal discharge.

The *progress* and *consequences* of accidental hemorrhage, during pregnancy, vary very much. If a small portion of the placenta be detached, the effused blood, confined between the placenta and the uterus, descends to the cervix, separating the membranes to a greater or less extent. A canal is thus formed, extending from the bleeding surface of the uterus to the os uteri. If the patient should remain quiet, and if the cause of hemorrhage be removed but active uterine contractions do not occur, the blood will coagulate in the vagina, in the cervix uteri, in the canal exterior to the membranes, and on the detached portion of the placenta, opposite to the bleeding surface of the uterus. These coagula will often arrest the bleeding, precisely as the "external coagulum," in cases of a wounded artery, checks the hemorrhage. Moreover, it is found that coagula will also be formed in the venous orifices of the uterus, still farther contributing, like the internal coagulum of a bleeding artery, to the same object. Hemorrhage being thus stopped, gestation may continue to term; and after delivery, coagula will be found on the surface of the placenta, and sometimes under its membranule, even if there had been no more bleeding for weeks or months previous.

The prospect of this favorable termination depends on numerous circumstances, such as the activity of the general circulation, the degree of uterine congestion, the presence or absence of the exciting causes, the continuance or suspension of uterine contractions, the extent of placental detachment, and the prudence of the patient or practitioner. Uterine contractions, in all such cases, are unfavorable to the arrest of hemorrhage,

as they will displace the coagula, and increase the separation of the placenta.

In cases of occult hemorrhage, such favorable terminations also occasionally occur; the blood effused is coagulated, and the child may be preserved to the full period; but, very generally, the effusion continues, the placenta is more and more detached, the child perishes from the suspension of the placental functions, and the mother will also die, unless rapid contractions ensue, and the whole ovum be speedily expelled. Then, and then only, will the hemorrhage be arrested by the condensation of the uterine tissue, and the consequent closure of the orifices of the venous sinuses. Under these circumstances, contractions arrest hemorrhage. These occult hemorrhages are more likely to occur when the placenta is attached to the upper part of the uterus, and especially where the central portion is separated, while the margins of this body remain attached to the uterus.

The *prognosis* of accidental hemorrhage is generally favorable to the mother; the mortality, according to Dr. Churchill, being one in six and two-thirds, or about fifteen per cent. Death sometimes occurs from the sudden and profuse character of the flooding, and from the blood being confined in the cavity of the uterus; yet a large majority of patients survive, because occult hemorrhage is rare, and because the bleeding is not unfrequently arrested by the formation of coagula; or, should this not occur, uterine contractions usually take place, so as to empty the uterus. The fœtus is in more danger, as it is often expelled prematurely, or dies from the interruption of its placental functions.

UNAVOIDABLE HEMORRHAGE.—PLACENTA PRÆVIA. —The peculiar character and essential cause of this accident have already been mentioned. It is rarely observed before the end of the fifth month; after which it is sometimes seen arising, according to the opinion of most authors, from the gradual dilatation of the internal os uteri, and the upper part of the cervix, causing a detachment of the placenta. M. Cazeaux, who insists that such development of the cervix does not take place before the ninth month, explains the occurrence of bleeding, at this period, by the alteration of form, which then is manifested in the lower part of the uterus, which changes from the ovoid to a globular shape. This explanation has been given also by Jacquemier.

During the latter periods of gestation, especially during the ninth month, unavoidable hemorrhage is far more frequent, owing to the more rapid development of the cervix, and even to the dilatation of the external os uteri.

Symptoms.—The first indication is often a sudden and profuse discharge of blood, causing alarm to the patient, and sometimes producing immediate faintness and severe nervous symptoms. Occasionally, especially in the early stages of gestation, it begins more moderately. Not unfrequently it is arrested, but it is very apt to recur, and often profusely, from any trifling accidental cause, such as sneezing, coughing, straining, or even moving in bed. The hemorrhage sometimes is constant, becoming more profuse at intervals, and may rapidly prove fatal, death being preceded, for a longer or shorter time, by the common evidences of exhaustion and collapse.

On examination per vaginam, the presenting part of the child can seldom be perceived; there is no "uterine tumor;" but the lower part of the uterus and cervix feels soft and swollen and, occasionally, the os is partially dilated. If the finger be introduced into the cervix, the edge of the uterine surface of the placenta can often be detected; but care must be taken not to mistake coagula for the placenta. The os uteri is often so high, that this examination cannot be made, without introducing, as Dr. Dewees says, the whole hand into the vagina. In performing this operation, the greatest care should be taken not to irritate the parts, nor to increase the dilatation of the cervix, or the further detachment of the placenta. Hence, vaginal examinations should not be repeated, the nature of the case being once ascertained.

Progress.—As already intimated, the recurrence of the hemorrhage may be generally anticipated, especially during the ninth month, when the enlargement of the cavity of the cervix increases rapidly. Hence, placenta prævia is often the cause of premature birth. This is not always the case; for, in many instances, there is no hemorrhage until the commencement of labor; while, in other cases, the sanguineous discharge is comparatively moderate, the coagula forming in the vagina, in the cervix uteri, and under the placenta, extending to the orifices of the bleeding vessels; thus, *pro tempore*, arresting the discharge. Subsequent hemorrhage, if not profuse, may be arrested in a similar manner, and the patient may, with great care, reach the full period of gestation. Generally, however, these coagula are inadequate to arrest, or, at least, to prevent, the hemorrhage; and the patient will perish, unless powerful contractions of the uterus supervene, so that the organ may be emptied, and the hemorrhage arrested by the condensation of its tissues.

Prognosis.—This is very unfavorable to the mother and her infant, unavoidable hemorrhage, fortunately a rare occurrence, being one of the most dangerous accidents incident to parturient women. Thus, Dr.

Trask, whose Prize Essay and valuable tables were published in 1855, in the Transactions of the American Medical Association, states, that the deaths from unavoidable hemorrhage prior to the full period were twenty-four per cent.; that few of these occurred before the end of the seventh month; twenty-eight per cent. during the seventh and eighth months, and twenty per cent. during the ninth month; while the deaths among the children were one hundred and sixty-six in two hundred and sixty-two cases, being a mortality of sixty-three and a half per cent.

The Treatment of Uterine Hemorrhage during Gestation will vary, in some respects, according as the placenta is located at the superior or inferior portion of the uterus, that is, whether it be a case of accidental or unavoidable hemorrhage.

Treatment of Accidental Hemorrhage.—In all practicable cases, the indication is to arrest the hemorrhage, that gestation may be continued to the full period with safety to the mother and child; although there are many cases where, from the violence of the cause, the profuseness of the hemorrhage, the degree of the separation of the placenta, and other circumstances, this indication must be abandoned, and the whole object of the physician must be to preserve the life of the mother, by securing the timely and complete emptying of the uterus.

To maintain gestation, all the predisposing and exciting causes must, as far as possible, be obviated. All mental and moral agitations must be quieted, and great attention be paid to remove all physical irritations, especially those arising from nervous or vascular excitements and sympathetic irritations of the stomach, bowels, bladder, etc. Absolute rest in bed is essential to the relief of uterine hemorrhage: there is no safety for the patient, even in a sitting posture. All straining must be carefully obviated; the bladder must often be emptied by the catheter, and the rectum by simple enemata. The diet should be simple, unirritating; the drinks should not be cold, for fear of bringing on uterine contractions, or hot, for fear of exciting the circulation; and all stimuli must be avoided unless the patient be weak or exhausted, when they may often be given with impunity, or with advantage. Bleeding from the arm is often essential for arresting hemorrhage and preventing labor, as general and local plethora are so frequently the predisposing or immediate causes of these accidents. The good effects of bleeding are often immediately apparent to the patient, as well as to her attendant. In some women, the tendency to congestion is so great, especially at the menstrual nixus, that frequent bleedings are demanded during the latter periods of gestation. Mauriceau

mentions the case of a lady who was advantageously bled eighty-six times during her pregnancy; and subsequent practitioners have found the lancet equally efficacious, although employed with much more circumspection than by the French accoucheur just mentioned. Occasionally, cups or leeches may be substituted for the lancet when the patient is not plethoric.

The next important agent is *opium*. It is invaluable, when properly timed, in relieving nervous and hysterical symptoms, quieting all organic and nervous irritations of the uterus, and, of course, preventing or relieving muscular contractions; hence, it contributes to arrest the hemorrhage, and prevent the further detachment of the placenta. Where opium, or some of its preparations, is not suitable, various other narcotics may be employed, according to the idiosyncrasies of the patient, to fulfil the same indications. Dr. Churchill speaks favorably of the tincture of *cannabis indica*. In most cases, anodyne enemata are preferable to the exhibition of these narcotic articles by the mouth; yet, not unfrequently, it becomes necessary to exhibit them through the medium of the stomach, in small and repeated doses.

Many physicians conjoin *astringents* with opium, such as the acetate of lead, kino, rhatany, gallic acid, tincture of iron, etc. Dr. Lee speaks in the highest terms of the acetate of lead. We agree, however, with Dr. Ramsbotham, that such articles are very generally inefficient in uterine hemorrhage dependent upon a local cause—the detachment of the placenta.

Local remedies are sometimes of importance; cloths dipped in cold vinegar and water applied to the vulva and to the abdomen have been much recommended, but their utility at this time is doubtful; indeed, they may positively prove injurious, especially when quite cold, by inducing contractions of the uterus, and thus increase separation of the placenta. "Dry heat," sinapisms, and other rubefacients are often important, especially to the extremities, to maintain an active, external circulation, and thus obviate the disposition to congestion.

By these and similar measures, the flow of blood is moderated, allowing coagula to form, by which it may be completely arrested. Should this not be the case, we have another powerful agent to promote the coagulation of the blood, and the arrest of the hemorrhage in the use of a "*tampon*" or "*plug*." Of its efficiency there can be little doubt, but of its *safety* there has been, and still is, much contrariety of opinion. It contributes to the arrest of hemorrhage, by favoring the coagulation of blood in the vagina, and at the os uteri, and thus in the canal between the membranes and the

uterus to the surface of the placenta. Two objections have been urged against the practice: the first is, that it stimulates the uterus to contraction, and thus, although temporarily advantageous, becomes decidedly injurious by increasing the separation of the placenta, augmenting the hemorrhage, and arresting the progress of gestation, and thus, it may be, causing the death of the infant. That the tampon may irritate the uterus, in some cases, is doubtless true, and, therefore, it ought not to be unnecessarily employed. We apprehend, however, that such irritation is not always the result of the tampon. It arises, more frequently, from its misapplication. The physician has been advised to *stuff* the vagina by strips of cloth, etc., distending this canal, as much as practicable, and then to apply a large compress externally, to be secured by a T bandage. That irritation may be excited by these measures, there can be no doubt, but, if one or two small portions of well-washed sponge, as recommended by Dr. Dewees, be introduced, without distending the vagina, and without the external compress and bandage, very little irritation, if any, will be produced; neither will there be any collection of fluids, for the watery parts of the blood will be absorbed by the sponge, or will flow off externally, while the disposition of the blood to coagulate will be facilitated, as readily as if great pressure had been exercised. Our experience, therefore, is that the tampon, thus employed, very rarely excites uterine contractions, especially if the injunction, formerly given, of removing it every ten or twelve hours, be heeded.

The other objection to the tampon is of a more serious character. It is affirmed to be very dangerous by preventing, either directly or indirectly, the escape of the blood from the uterus, and hence causing it to collect between the placenta and the uterine tissue, detaching the former body, sometimes completely, while, owing to the swelling of the uterus, the blood continues to accumulate until the patient perishes. Occult hemorrhage, it is therefore said, is the consequence of the use of the tampon during gestation, especially after the sixth month.

It is very difficult to decide as to how much importance should be given to this objection. This difficulty arises from the contradictory character of reported facts and observations, and from the variety of opinions presented, by experienced practitioners, on this interesting subject. The question has been debated as to the relative advantage of the tampon, as compared with *rupturing the membranes*. The advocates of the former maintain that, very universally, the plug will arrest hemorrhage, and that usually gestation will continue; moreover, that occult hemorrhage will sel-

dom, if ever, occur. They object to puncture of the membranes, because gestation is arrested, and that the bleeding often continues, enhancing greatly the dangers to mother and child. As the os is not dilated, delivery is impracticable; the blood will accumulate in the uterus, about the child, so that the mother perishes, the practitioner, under these circumstances, having no efficient agent at command. Drs. Dewees and Churchill record cases of this kind. To the child, the danger is imminent: as it is premature, as it is now exposed to the direct effect of uterine contractions, which compress it against an undilated os uteri, while, at the same time, still further detachments of the placenta are continually taking place.

To rupture the membranes is quite an old practice, when compared with the use of the tampon, which latter is said to have been first employed by Leroux, in 1776. At the present day, the weight of authority is in favor of the old practice. The advantages said to result are, that the hemorrhage is very universally arrested. Thus Mr. Rigby asserts that, in sixty-four cases, after rupture, the patient was safely delivered, even without version; and, moreover, that if the tampon be employed, the liability to occult hemorrhage is exceedingly great.

Future experience and observation must decide the truth of these affirmations. Judging from our limited experience in uterine hemorrhage during pregnancy, we should prefer employing the tampon, in most cases of accidental hemorrhage, for the following reasons:—

First. Because occult hemorrhage is a very rare accident, under any circumstances, and especially after the use of the tampon, made of small pieces of sponge; where the fluids are allowed to escape, and yet coagulation of the blood facilitated.

Second. No occult hemorrhage can occur unless the uterus yields, as the ovum, when entire, is incompressible. The yielding of the tissues of the uterus seldom occurs, as the pressure from the effused blood very universally stimulates the uterine fibres to contraction, forcing the blood to the orifice of the uterus.

Third. The tampon is very effectual in arresting hemorrhage, unless it be profuse, and, in such cases, it moderates the discharge, so that time is gained until the os uteri be dilatable.

Fourth. Should it succeed, the life of the child, as well as that of the parent, are usually secured.

Fifth. On the contrary, if the membranes be punctured, the child, even if the hemorrhage be arrested, is in the greatest danger from its immaturity and the compression to which it and the placenta are subjected before delivery can be accomplished.

Sixth. If, after the rupture, the hemorrhage should

continue, the danger to the mother, as well as to the child, is most imminent; as, under the circumstances, the ordinary remedies for arresting hemorrhage are very inefficient, and almost the only chance left for the unfortunate mother is "forced delivery," which all acknowledge to be fraught with the greatest peril, especially as the patient is already weakened from the loss of blood.

Although, therefore, rupturing the membranes may often be employed, yet, in most cases, a previous resort should be had to the tampon; for, as M. Cazeaux observes, after detailing the objections to its use, "but, after all, we cannot do without the tampon."

Should the hemorrhage be arrested by this or any other measure, the greatest possible care is demanded to prevent its recurrence. The practitioner should never forget that, so long as gestation lasts, the only obstacle to this accident is the presence of the "external" and "internal coagula," which may readily be disturbed by any muscular exertion on the part of the woman, or by any nervous or vascular excitement.

Should the hemorrhage, however, continue profusely, all hope of preventing labor must be abandoned, and measures adopted to save the more important life of the mother, at the imminent risk of the infant.

Puncturing the membranes is, therefore, generally advised under these circumstances, and is often very successful. Labor supervenes, the os uteri may gradually yield, and the child being expelled, the contractions of the uterus are so complete, that there is little danger of a return of the bleeding. The woman is considered safe, unless previously greatly exhausted. If these contractions be too feeble to arrest the hemorrhage and to complete the labor, they may be augmented by the internal use of ergot, and also by the free use of cold to the uterine region; sometimes, even, by the introduction of ice into the vagina, or by cold injections into the rectum, care being taken to maintain the warmth of the extremities by suitable applications.

The woman, however, cannot be regarded as safe because the liquor amnii is evacuated; for, in some instances, as already mentioned, the hemorrhage will continue, and even be increased by the further detachment of the placenta, and the blood may now accumulate in the uterus, causing the death of the mother and child before delivery can be accomplished.

Such being the dangers which may result from puncturing the ovum, it has been suggested by Dr. Simpson and Mr. Barnes to excite dilatation of the os uteri by means of "dilators." Dr. Simpson proposes to introduce a sponge tent into the orifice of the uterus, and Mr. Barnes very strongly recommends small caout-

chouc bags or tubes carried into the cervix, by means of a catheter or canula, so that they may be distended by means of air or water. Contractions of the uterus and dilatation of the os uteri, followed by the expulsion of the infant, can thus be rapidly induced. It might be urged that danger of occult hemorrhage would still exist. This may be true, but the dangers diminish by the increased activity of the uterine contractions, which will prevent any great accumulation of blood. If, therefore, the tampon in the vagina should fail, these dilators may be employed with a greater prospect of arresting the hemorrhage and preserving the life of the infant, than if the waters be evacuated. Perforation of the membranes may and should be a *dernier resort*.

Treatment of Unavoidable Hemorrhage.—When, by a proper examination, the nature of the case has been ascertained, the danger to the woman must be regarded as imminent, and therefore all possible precautions should be enforced, and the accoucheur be always within call of the patient. In all cases, absolute rest should be enjoined during the remainder of pregnancy, and all sources of irritation be sedulously avoided. If the hemorrhage be moderate, it may cease spontaneously if the woman be recumbent, or the arrest may be secured by the employment of the tampon. Few practitioners are opposed to the plug in these cases of placenta prævia, as they do not apprehend the collection of blood in the uterus.

We must object, however, to the “stuffing” of the vagina, for reasons already given, believing that portions of sponge will be adequate to favor the coagulation of the blood, and to support the coagula without making any pressure. The plug should be allowed to remain for some ten or twelve hours, and then be carefully removed, so as not to disturb any coagulum in the os or cervix uteri. A fresh piece of sponge may be substituted, so as to support the coagulum, preventing its displacement.

By this and the various precautionary measures formerly suggested, gestation may be maintained sometimes even to term; although there may be an occasional recurrence of the discharge. If the hemorrhage be profuse, this happy result is seldom attained; but labor, attended with the necessary increase of the hemorrhage and the consequent increased danger to the patient, will ensue.

HEMORRHAGE DURING LABOR.

The usual exciting causes of flooding may here also be operative, but uterine contractions are now superadded, augmenting the detachment of the placenta, and

the consequent increase of the flooding. The phenomena and dangers of this accident are exceedingly modified by the location of the placenta; whether this body be high up in the uterus or be implanted over the os and cervix uteri. During labor also, therefore, hemorrhage may be “accidental” or “unavoidable.”

ACCIDENTAL HEMORRHAGE.—Severe flooding, when the placenta is high up, is not common; and even when the discharge is somewhat copious at the commencement of the process, it gradually diminishes and disappears as the uterine tissues become condensed. If, however, the contractions be feeble, and further detachment of the placenta occurs, the bleeding may be of a serious character.

The *diagnosis* is, of course, easily established when the blood appears externally; but, if it be occult, no suspicion is often excited until symptoms of debility or exhaustion are manifested by the patient. At this juncture an external examination of the abdomen reveals the formation of a swelling or tumor of the uterus—its walls yielding from the internal pressure of the blood. As formerly intimated, this is a rare accident at any time, and seldom, perhaps, occurs originally after labor has commenced. It is more frequently, therefore, an exciting cause of labor.

The *consequences* of hemorrhage depend on its degree and on the strength of the patient. When profuse, it may prove fatal before delivery can be completed, especially where the woman is feeble, or where there is a great rigidity or firmness of the os and cervix uteri. In most cases, however, in consequence of the loss of blood, the orifice of the uterus becomes relaxed, so that the process of dilatation goes on rapidly, the membranes are ruptured, and the hemorrhage will soon cease by the continuation of uterine contractions, causing the expulsion of the child and the closure of the open orifices of the venous sinuses. In occult hemorrhage, the danger to the mother is greater as the uterus contracts feebly, and much blood may be accumulated; but even in these cases, dilatation of the os will ensue rapidly from the relaxing influences of the bleeding, followed by active uterine contractions and the expulsion of the child. In such cases the placenta is soon discharged, as the process of detachment had been previously nearly or quite completed, and its expulsion is followed by masses of coagulated blood. In some instances, the whole ovum has been delivered entire, the placenta and membranes having been completely separated from the internal surface of the uterus by the effused blood.

If accidental hemorrhage, therefore, occur during labor, its complete arrest cannot positively be antici-

pated until the uterus be emptied. It is nevertheless true, that, in many instances, the hemorrhage will cease after the liquor amnii has been evacuated. The bleeding ceases, not from the formation of coagula, but from the closure of the venous orifices, by the contraction of the uterine fibres.

The *prognosis*, therefore, in cases of accidental hemorrhage during labor, is generally favorable to the mother, the mortality, according to Dr. Churchill, being one in six and two-thirds cases, or fifteen per cent., and the recoveries, therefore, eighty-five per cent. Occasionally the danger is great, demanding the assistance of art and science.

UNAVOIDABLE HEMORRHAGE—PLACENTA PRÆVIA.—

If the implantation of the placenta over the lower segment of the uterus be of serious import during gestation, owing to the gradual development of the cervix uteri, the gravity of this accident is excessively enhanced by the occurrence of labor; for now, every contractile effort of the uterus necessarily excites bleeding by dilating its orifice, and thus detaching portions of the placenta. This unavoidable hemorrhage is greater when the central portions of the placenta are over the cervix, and more moderate when an edge of this body presents at the os. The hemorrhage, however, is great, even when the placenta is attached to one side of the cervix, and not directly over the os uteri, inasmuch as the neck of the uterus is rapidly enlarged during the first stage of labor.

It results, therefore, that the woman cannot be safe until labor be completed. But, unfortunately, the bleeding is so profuse, that many patients will perish before this process can be terminated, or even before the os uteri can be dilated. When, however, labor advances slowly, and when a mere edge of the placenta presents, it occasionally happens that blood will coagulate between the placenta and the uterus, and even in the orifices of the exposed vessels, so that a temporary suspension ensues, and time is thus allowed for the dilatation of the os, and, it may be, for the safe termination of the labor.

In other cases it has happened, especially in vigorous women, that the os uteri dilates rapidly, powerful contractions of the uterus supervene, the placenta is forced out of the uterus, and is speedily followed by the infant, both mother and child surviving. More frequently the child perishes, although the mother may live. This spontaneous delivery is more apt to occur in "central presentations" of the placenta, than in those where this body is affixed to one side of the cervix. Experience has also demonstrated that, occasionally, the placenta is thrown off from the uterus, but the

child remains for a longer or shorter time; and, that in such cases the hemorrhage generally ceases after this spontaneous expulsion of the after-birth. The author was called to a woman of laborious habits who had been flooding severely for several hours under the care of a midwife. On his visit, he found a transverse presentation of the child, the left arm projecting from the vulva. On introducing his hand into the vagina, he recognized the whole placenta in this canal, the hemorrhage having ceased entirely three hours previously. The mother did well; the child was readily delivered by version, but, of course, was dead. Dr. Simpson has collected one hundred and thirty cases of a similar character, showing that, very generally, hemorrhage ceases on the delivery of the placenta, even when the child is retained.

The *Prognosis* is, therefore, not always unfavorable. The mother may escape, in consequence of the ready dilatation of the os uteri, facilitated by the loss of blood, and followed by the energetic contractions of the uterus. Even when the uterus acts slowly, the formation of coagula of blood may so diminish the flooding that delivery may safely ensue. Nevertheless, fatal results from unavoidable hemorrhage during labor are unfortunately so common, that the greatest apprehension must always exist in the mind of the practitioner as to the result of the labor.

The *Frequency* of placental presentations is reported, by Madame Boivin, as being one in 2,554 cases of labor, by Dr. Joseph Clarke, as one in 2,596, while Dr. Collins, of the Dublin Hospital, reports one case in 1,492. Dr. Simpson finds that, out of one hundred and thirty-six cases reported by various authors, eleven only occurred in primiparous women, showing the relative infrequency of this accident in first labors.

The *Fatality* of these cases of placenta prævia has been estimated, by Dr. Robert Lee, as being thirty-three per cent. to the mother, and about sixty-six per cent. to the child. Dr. Trask reports that, out of two hundred and thirty-six cases artificially delivered, sixty-four were lost, being a little over twenty-seven per cent. Spontaneous delivery of the placenta is, however, more favorable to the mother. Thus, Dr. Trask states that, out of one hundred and fifty-one cases, eleven died and one hundred and forty recovered, a mortality of about seven and a half per cent. Dr. Simpson has collected one hundred and thirty cases, in which ten died, or less than eight per cent. As regards the child, reports are less satisfactory, the result not being usually stated. Dr. Simpson mentions that, of one hundred and ten children, in seventy-three the infant was dead, the mortality being about sixty-six and half per cent.

The Treatment of Hemorrhage during Labor requires some special directions, which are often of great importance. These directions must differ, in some degree, whether the hemorrhage be accidental or unavoidable. In all cases, however, the general truth must be remembered, that whatever partial benefit may result from the temporary diminution of hemorrhage by the formation of coagula, yet there is no safety for the woman until the uterus be emptied.

Treatment of Accidental Hemorrhage.—During the first stage of labor, the great object of the practitioner must be to diminish the flow of blood, by measures already suggested, when speaking of hemorrhage during gestation. Thus, perfect rest and the removal of all sources of excitement are all important. Occasionally, if there be great plethora, venesection may be immediately employed, and all inordinate excitement of the nervous system may be moderated by the use of anodynes. There can be no hesitation, as contractions of the uterus exist, in administering cold drinks, and also in applying cold cloths to the abdomen, while the proper temperature of the extremities is maintained by heat and other revulsives.

If the hemorrhage be moderate, these measures will be alone necessary. Should it, however, be profuse, more decided treatment must be adopted. Cold injections may be employed to the rectum and to the vagina; pieces of ice enveloped in a cloth may also be introduced into the vagina. But, the os uteri not being dilated, and the external hemorrhage continuing, the tampon should be employed; not, however, as usually directed—by filling up the whole vagina, and securing the “plug” by a compress and T bandage—but by using pieces of sponge, as recommended by Dr. Dewees, or the gum-elastic bag moderately distended with cold water, so as to allow the escape of fluids from the vagina, while, at the same time, the coagulation of the blood at the os uteri is facilitated. The objections to the tampon, especially that it may confine the blood in the cavity of the uterus, without arresting its effusion, have already been noticed, when speaking of hemorrhage during gestation; but we must believe this last danger has been greatly overrated. Dr. Dewees asserts that the tampon, in his hands, was always successful in relieving the hemorrhage, without any bad consequences resulting; and every one acknowledges that the occurrence of occult hemorrhage, after labor has been once excited, is rare. The contractions of the uterus are very universally sufficient to prevent any swelling or dilatation of this organ, and, at the same time, to force the blood between the membranes and the uterus to the cervix and os uteri. If, therefore, a sponge be employed, and if the practitioner, as

in duty bound, remains with his patient, and is very watchful as to any indications of weakness or exhaustion, and to any tumor which may possibly form upon the uterus, we think that the use of the tampon is a good and safe practice; especially, as it in no way precludes the resort to other measures, should they be demanded.

Plugging the cervix uteri by means of sponge tents, or by the gum-elastic bags, already alluded to, may sometimes be very advantageous. The effect would be to facilitate the coagulation of the blood, by causing its stagnation within the uterus, and also to stimulate the uterine powers, so that dilatation of the os uteri and the progress of labor would be rapidly hastened. Mr. Barnes says, that in a few hours, at the farthest, the whole process will be completed. The danger of occult hemorrhage, by these measures, might be great; but it is counteracted by the increase of the contractions of the uterine fibres, and therefore, if judiciously employed, these dilators may occasionally be very useful.

Perforation of the membranes is generally recommended as preferable to either the vaginal or uterine tampon. Dr. Rigby affirms that in sixty-four cases, the hemorrhage was always arrested by the evacuation of the liquor amnii; and this is generally confirmed by the report of most modern authorities. Nevertheless, many exceptions have occurred. Drs. Churchill and Dewees mention cases where the child and mother have perished, and large quantities of blood have collected in the uterus after the perforation of the membranes. This practice, therefore, is not without danger; especially, as the os uteri is not dilated, immediate delivery is impracticable, and other measures are comparatively inefficient under these circumstances. The membranes, therefore, ought to be preserved as long as practicable, unless there be decided evidences of exhaustion, or until the os uteri be dilatable; then the waters being evacuated, the contractions of the uterus, with or without assistance, soon expel the child, and the hemorrhage will be permanently arrested.

Should, however, unfortunately, the os uteri be not dilatable, after the waters are evacuated, and the hemorrhage continue, the process of labor must be hastened by every practicable measure. The sponge tents or gum-elastic dilators of the cervix, as proposed by Mr. Barnes, may be employed for this purpose. This being inadequate, the practitioner will sometimes be justified in resorting to “forcible delivery.” This last may be accomplished in two ways. The patient being etherized, to render her insensible to pain, and to promote the relaxation of the os uteri, that the operation of *version by the feet* may be executed. The feet being

brought down, the hemorrhage very universally ceases, and the further process of delivery may be left to uterine contractions. Sometimes, however, it should be completed artificially. This forcible delivery by version, the os being undilated, must be restricted to extreme cases; for the results of the operation are very frequently disastrous, in consequence of the irritation, contusion, and even laceration of the os and cervix uteri, the difficulty of executing the operation, and the imminent danger of subsequent inflammation or prostration. The child very universally perishes, and the mortality to the mother is perhaps forty or fifty per cent.

The second mode of forcible delivery is by *craniotomy*, especially when by auscultation the death of the child has been ascertained. The head being perforated, and the contents of the cranium evacuated, Johnson's tractor or the craniotomy forceps may cause the descent of the head and the gradual dilatation of the os, so that delivery may be effected and the hemorrhage arrested. The injury to the mother's tissues, and the effect upon her general system, would generally be less than that produced by the forcible introduction of the hand.

Should occult hemorrhage be detected, or even suspected, the tampon in the vagina should never be employed; the membranes should be immediately ruptured, the ergot be exhibited, and every other measure adopted to expedite delivery.

Treatment of Unavoidable Hemorrhage.—The same indications as in accidental hemorrhage are to be fulfilled, viz., to diminish, as far as practicable, the hemorrhage, until the os uteri be dilatable, and then to empty the uterus. The fulfilment of these indications is, however, far more difficult, and the dangers to the mother and child are far greater. It is not easy to estimate the relative value of the various measures proposed for the management of these terrible cases, especially as they are comparatively so rare that the experience of an individual practitioner cannot be very great—occurring, as already mentioned, only about once in twenty-five hundred cases.

As soon as it has been ascertained that a woman in labor has either a partial or central presentation of the placenta, she should be placed in bed, with the hips somewhat elevated, and the head depressed. All hot or stimulating drinks should be avoided; they should be cold and acidulated. The bladder should be evacuated with the catheter, and the rectum by enemata. All coughing, sneezing, and straining should be suspended as far as practicable.

If the os uteri be *undilated*, and *not dilatable*, the *tampon* should be immediately employed. Several pieces of sponge, to which strings have been attached,

should be placed in the vagina; or one portion may be first introduced, and then kept in apposition to the cervix uteri, by means of a distended bag of caoutchouc. By this arrangement, coagulation of the blood will be facilitated, and the coagula be sustained at the orifice of the uterus, and in the cervix—favoring, therefore, the formation of not only the “external,” but also the “internal coagula,” and thus diminishing the hemorrhage. Occasionally the tampon may be removed and then replaced; but this is to be avoided if possible, as it almost necessarily disturbs the intra-uterine coagula. It is best, therefore, to allow it to remain, not always until the os uteri be dilated, but dilatable.

As soon as this is the case, a large majority of practitioners recommend the removal of the tampon, and immediate resort to version by the feet, to empty the uterus. The merits of this practice will be presently examined. As regards the tampon, most obstetricians advise its employment, as they do not apprehend any danger, in these placental presentations, from occult hemorrhage, and there can be little doubt of its efficiency in diminishing hemorrhage, and sometimes of suspending it, even for hours. Thus, Dr. Trask reports twenty-eight cases, collected from many authors, including Lachapelle, Lee, Radford, Simpkin, Jameson, Dewees, etc., where the tampon was employed. Of these, in five cases, the result was not stated; of the remaining twenty-three, in thirteen the bleeding was arrested for several hours; in five, uterine contractions speedily ensued, followed by delivery; in one, although the mother was apparently dead, being pulseless and cold, yet her system reacted under stimuli, and the child was delivered spontaneously, the mother recovering; while in four cases no apparent effect was produced. The tampon, therefore, says Dr. Trask, is a “precious remedy.” Dr. Dewees affirms that, in his experience, a resort to the tampon is sufficient to arrest the hemorrhage until the os is “dilatable;” and he also says that—“I am certain it never can be absolutely necessary to interfere until then.” Indeed, most of the leading authorities recommend the tampon in cases of placenta prævia, and have no fears of occult hemorrhage. Dr. Meigs, on the contrary, is exceedingly opposed to its employment, insisting that the blood will continue to be effused, and not escaping externally, will collect in utero, separating the placenta and membranes, and thus aggravating the dangers of the case.

The dilatability of the os uteri sometimes occurs very suddenly, when no time should be lost, as otherwise syncope and exhaustion may speedily follow. The practitioner, also, says Dr. Dewees, should carefully distinguish between that dilatability which arises from contraction of the uterine fibres from that which results

from exhaustion. In this last case, as soon as the os uteri begins to yield, delivery should be attempted.

Although some exceptions may be cited respecting the success of the tampon, our experience, in its favor, coincides with the testimony above presented, and, we think, as will be presently mentioned, its use may be extended even to the second stage of labor. It has been thought that the plug would be rendered more efficient if it should be made the vehicle for the *local application of astringents*, as Dr. Dewees advises the sponge to be dipped in vinegar before its introduction into the vagina. He quotes Dr. Kok as proposing various astringent articles to be used in a similar manner. And, still more recently, M. Pajot has employed the sesquichloride of iron applied to the cervix. The well-known efficiency of this last styptic might encourage its trial under peculiar circumstances; but in placenta prævia little dependence can be placed on astringents, either internal or external.

If the os be rigid, and the hemorrhage continue, notwithstanding the employment of the above measures, Mr. Barnes has suggested the introduction of a *caoutchouc bag into the cervix uteri*, to be distended gradually with air or water. The effect of this, he says, would be to arrest the hemorrhage, to hasten the dilatation of the os, and to stimulate the uterus to contraction. Labor may thus be greatly accelerated, and as the ovum need not be ruptured, the prospect for the child may be improved. Many arguments for and against this proposition might be urged, but they may be deferred, as the value of the suggestion must be determined by multiplied experience.

Experience has shown that, in some instances, where *rupture of the membranes* has taken place, and where the liquor amnii has been discharged, the hemorrhage in placenta prævia has been greatly diminished, or even arrested, thus gaining time for dilatation of the os, and the delivery of the infant. The explanations given differ: some attribute the arrest of the hemorrhage simply to the condensation of the tissues produced by the contractions of the uterus; others to the complete detachment of the placenta, which they think, ensues; while others, again, refer it to pressure of the child's head against the bleeding surface. The suspension of bleeding, under these circumstances, occurs much more readily in partial than in complete presentations of the placenta; and hence, some would restrict it to such cases. Rupturing the membranes is easily effected where a portion of them can be felt during the existence of a pain; but when the whole os uteri is covered by the placenta, the operation is more difficult. It may necessitate the introduction of the hand

into the vagina, and the carrying of the finger between the placenta and the internal surface of the uterus, by which the coagula will be greatly disturbed, and additional portions of the placenta be detached. Probes or canulæ may be advantageously substituted for the finger for perforating the membranes. In preference to either of these modes, Gardien and others advise that the puncture should be made through the placenta, by means of a trocar and canula; as this, however, would involve perforation of the child's vessels, it ought to be restricted to cases where the child is dead, or where all hope of its preservation is abandoned.

The results of rupturing the membranes are, upon the whole, favorable. For, although Baudelocque states that out of twenty-five cases, in which puncture was employed, only one was decidedly benefited: Dr. Ramsbotham, junior, reports that out of forty cases, in which the membranes were ruptured early, thirty-two recovered; in all, the hemorrhage was materially diminished; four only died of hemorrhage before delivery; and in four others death occurred, one from malignant puerperal fever, one from inflammation ten days after delivery, and two from adherent placenta. Most practitioners have observed good effects from rupturing the membranes, but do not consider the operation so useful as in cases of accidental hemorrhage. Dr. Simpson says it often succeeds in partial presentation of the placenta. This is the testimony, also, of Drs. Tyler Smith and Robert Lee, and of MM. Cazeaux, P. Dubois, and others. Some, however, object. Dr. Dewees says that it is seldom proper, as the operation is not always easily performed, that the hemorrhage often continues, and even if suspended will be reproduced on the recurrence of uterine contractions. It is also contended by him and others that, if the hemorrhage does not cease, rupture of the membranes renders the operation of version more difficult. Dr. Simpson observes that this is really no objection, as other operations may be resorted to, if the hemorrhage continue after the perforation. M. Cazeaux authorizes the use of the tampon, assisted by pressure on the abdomen, if the hemorrhage be profuse, and the liquor amnii evacuated.

The *secale cornutum*, so efficient in producing contractions of the uterus, has, on this account, proved very useful in some cases of placenta prævia. It augments the uterine forces, hastens the dilatation of the os uteri, and the progress of labor, and, as regards the hemorrhage, forces the child firmly against the placenta and the bleeding surface of the uterus. Thus, Dr. Fountain, of Peekskill, New York, states that in two cases of profuse hemorrhage, where the os uteri was rigid and slightly dilated, twenty grain doses of

ergot excited steady contractions of the uterus, until the os was sufficiently dilated to admit of version by the feet with safety to mother and child. In many other cases it has been useful, but has so often failed that it has probably been too much neglected; its use is not free from danger, as the os, not being dilated, uterine contractions may become so vehement, that laceration of the uterus may ensue, or even convulsions may be excited. Dr. Murphy thinks, also, that if there be great exhaustion of the mother's forces, the ergot may prove too sedative, and advises, in such cases, that its use be preceded by the exhibition of brandy. The danger to the child, also, is imminent, as it becomes firmly compressed, when the os uteri is undilated, by the uterine contractions. Nevertheless, if it be administered when the os uteri is partially dilated, and when the tampon and rupture of the membranes have failed, it promises to be a powerful adjuvant in arresting hemorrhage, and hastening the progress of labor. After the os uteri is dilatable, the ergot may be safely and advantageously employed.

Should the accoucheur, however, determine that version by the feet is desirable, the administration of ergot should seldom be employed, as it will render this operation more difficult and dangerous.

Galvanism has also been suggested to augment uterine contractions, when there is severe hemorrhage.

By "*forcible delivery*" is understood the attempt to deliver the child before the os uteri is dilatable. The usual mode adopted is by forcing the hand into the uterus, and resorting to version by the feet. Occasionally, however, the head is perforated, and delivery effected by means of tractors, craniotomy forceps, etc.

Many physicians have felt themselves justified in resorting to forcible delivery, when the hemorrhage is profuse, the patient weak, and the os uteri unyielding, believing that, by this measure alone, the life of the mother could be preserved.

The dangers from *podalic version*, when the os uteri is rigid, are exceedingly great. The orifice of the uterus is irritated; it is often contused, lacerated, or completely ruptured. Moreover, as Dr. Simpson has remarked, lacerations of the cervix, in cases of placenta prævia, are more than usually dangerous, from the great development of the uterine blood-vessels where the placenta is attached. There is, also, increased detachment of the placenta, augmenting hemorrhage, and if version be accomplished, there is again delay, pain, and danger of increased laceration by drawing the child through a contracted orifice. The child, very universally, perishes from the injury to the placental circulation, and from the delay caused by the arrest of the shoulders and head at the

os uteri. Dr. Trask informs us that out of twenty-two cases of version with undilated os, nine women perished, and thirteen recovered, which is in the proportion of one in two and four-ninths, or nearly forty-one per cent. fatal. Dr. Simpson's tables give us a still more unfortunate result, for, out of twenty-five women where version was performed with the os undilated, twenty-one died, and only four recovered, being a mortality of eighty-four per cent.

The dangers from *perforation of the cranium*, according to Dr. Trask, is by no means so great to the mother, as out of seven cases but one woman was lost, or a little more than fourteen per cent.

As forcible deliveries proved so unfavorable, and as observation had demonstrated that, in many cases, hemorrhage was arrested in cases of placenta prævia by the expulsion of the placenta, Dr. Simpson, in 1841, suggested that the *artificial detachment and removal* of this body might be attended with equal beneficial results, and thus prove a valuable substitute for forcible delivery. This practice he has urged with his characteristic earnestness, and, by an array of statistics, has influenced the opinions of many obstetricians in its favor. He states that out of one hundred and forty-one cases, where the placenta was expelled before or with the child, in five the result was not known; out of the remaining one hundred and thirty-six, one hundred and twenty-six mothers survived. It does not appear, however, from this statement, in how many cases the deliverance of the placenta was artificial. He cites Dr. West as reporting seventeen cases of artificial delivery of the placenta, in which sixteen recovered.

As will be observed, these statements appear very favorable, when contrasted with the deaths connected with forcible delivery, as already stated; and even when compared with the proportion of deaths from the ordinary modes of treatment. This last, Dr. Trask states, to be about one in 3.95—that is, that out of nine hundred and thirty-eight cases of placenta prævia, two hundred and thirty-seven mothers perished. Respecting artificial delivery of the placenta, the cases reported by Dr. Trask would present a much less favorable result than those of Dr. Simpson. The deaths, out of sixty cases, being thirteen, or one in 4.6; while, in spontaneous delivery of the placenta, the deaths were less than one in fourteen. The cause of this difference is that where spontaneous delivery takes place, there are active contractions of the uterus, generally speedy dilatation of the os, and rupture of the membranes, so that the hemorrhage is arrested, and the whole process of labor quickly completed before exhaustion occurs. In artificial delivery, on the contrary, the contractions are often moderate, and, of

course, the stages of labor are proportionally tedious, while the hemorrhage, prior to the separation, has been profuse, and after the detachment it does not always entirely cease.

The question why hemorrhage should cease after the placenta has been separated has not been satisfactorily answered. Our own impression is, that it is chiefly due to the condensation of the uterine tissue, resulting from the evacuation of the liquor amnii, which usually takes place. This is confirmed by the fact, already mentioned, that the simple puncture of the membranes will, in many instances, be sufficient to arrest the bleeding, in cases of placenta prævia; and in cases of accidental hemorrhage, the evacuation of the liquor amnii is very generally successful, as has already been mentioned. It is found, also, that, in cases of twin deliveries, when the placenta are distinct, one child and placenta may be delivered, while the other ovum is retained, and yet without any great hemorrhage.

Dr. Simpson, however, contends that so long as the placenta is attached to the uterus, it is a source of excitement, determining large quantities of blood to itself; and that much of the blood, therefore, evacuated comes from the body of the placenta. He confirms this idea by the well-known fact, that there is little or no hemorrhage after the delivery of the placenta, which has been long dead in the uterus. Although there can be no doubt that a living, adherent placenta determines blood to the uterine surface, where it is attached, yet it is well known that the most copious flooding will often ensue from the uterine surface, after the placenta is removed. Indeed, for reasons formerly given, we have great doubts whether blood, in any quantity, is ever effused from the placental surface.

As to the circumstances in which the artificial delivery of the placenta should be employed, positive directions cannot be given, as the advantages and disadvantages of the practice cannot yet be fully estimated. Let it not be forgotten, however, that Dr. Simpson would restrict the operation to cases of undilated os uteri, where the hemorrhage is profuse, and where immediate delivery is impracticable. If the os uteri be dilatable or dilated, immediate delivery is necessary, and then it is a question comparatively of little importance, whether the placenta be or be not previously removed.

A question of practical difficulty here arises, so great as may perhaps nullify the value of this operation. How is the placenta to be removed, if the os uteri be rigid, not even dilatable? Dr. Simpson and other authorities advise that it should always be done by the hand, objecting to the use of instruments. Now, in these cases, the hand cannot be in-

troduced into the uterus, and it is sometimes difficult and always painful, especially in primiparous women, even to introduce it into the vagina. To detach the placenta, therefore, when the os is small and unyielding, with the finger alone, is, by no means, always easy or practicable. Hence, Dr. Radford would restrict the operation to those cases where the os and cervix uteri are sufficiently dilated to introduce the hand. In these cases, however, the detachment of the placenta would not be necessary, as version could be immediately effected.

Detachments of the placenta cannot be accomplished in premature labors, where the os and cervix are still undeveloped.

If, therefore, the extraction of the placenta should be restricted to cases of severe hemorrhage, with a rigid os uteri, and if the operation can only be performed by the hand, the conditions to which it is applicable must be very limited. The question, however, might be examined, both theoretically and practically, whether detachment and extraction of the placenta might not be safely effected by means of suitable instruments, such as small blunt-hooks, abortion forceps, etc., or even by injections of water into the uterus.

The sphere of the operation has been extended, to include cases of exhaustion, so great, that even if delivery could be effected, the patient might sink. Time might be gained by removing the placenta, and thus arresting the hemorrhage, so that the patient's system may react, and delivery be subsequently accomplished. It may also be proper to remove the placenta when the contractions of the uterus are powerful, and the presentation of the child favorable, in order to arrest the hemorrhage and allow the natural expulsion of the child. It is to these two last cases, says Dr. Churchill, that the statistics of Dr. Simpson almost exclusively apply.

As regards the *child*, its life must be considered as abandoned whenever the placenta is extracted and the os uteri is rigid; for the delay requisite before delivery can occur, prevents all hope of the infant surviving. Thus, Dr. Simpson reports but one case where the child survived unless delivered within ten minutes after the extraction of the placenta. In other cases, where delivery was completed in a few minutes, the infant was often preserved. Thus, says Dr. Trask, out of forty-seven cases, fifteen children were saved—or nearly one in every three. It is, however, doubtful whether in all these instances the child would not have been equally safe without the operation; for Dr. T. also reports that the ratio of mortality of the children, in all cases of placenta prævia, is about two in every three cases.

Mr. Barnes has recommended that in partial presen-

tations of the placenta that only that portion be detached which is connected with the cervix uteri, under the hope that the remaining portion will not be separated until delivery be effected; the hemorrhage, he thinks, would thus be arrested, and, at the same time, the placental functions continued. Experience does not seem to have confirmed this suggestion,—there will be no security that the hemorrhage will not return, and if, as Dr. Simpson and others suppose, the blood flows partially from the surface of the placenta, no good would result unless the detachment of this body is complete.

Such are the important measures at command for the management of unavoidable hemorrhage during the first stage of labor—that is, before the os uteri is dilated or dilatable. Observant practitioners insist that in all cases delivery should be hastened by every practicable measure, as soon as the orifice of the uterus is *dilatable*, as it is very dangerous to wait until it is completely dilated. Time is here all-important. The first stage of labor, therefore, in cases of placenta prævia should be considered as terminated as soon as the os uteri is sufficiently relaxed to yield to the pressure of the head of the child, or the hand of the accoucheur.

Statistics, says Dr. Trask, fully confirm this observation, showing clearly that many patients have perished in consequence of delivery not being effected before the os uteri was dilated—the recoveries being more frequent when delivery was brought on as soon as the orifice of the uterus relaxed.

An occasional examination per vaginam must, therefore, be made to ascertain the progress of the labor; and yet such examinations are injurious by disturbing the tampon and the coagula of blood. Some practitioners recommend the removal of the tampon while making an examination. We think this, however, unnecessary; for if the finger is slowly and carefully introduced directly under the urethra, it passes above the tampon, which intervenes between the bladder and the coccygeal region of the pelvis. The edges of the os uteri can then be carefully examined, with very slight disturbance either of the tampon or coagula.

The management of the second stage of labor in unavoidable hemorrhage must vary according to circumstances. If the uterine contractions be strong, the os uteri rapidly dilating, and the presentation be favorable, there can be no doubt that no active interference is demanded. The membranes, however, must be soon ruptured, so that the liquor amnii may be evacuated, that the uterus may be diminished, and that the child may be pressed firmly against the placenta and the bleeding vessels. The patient should be encouraged to

bear down, and if there be any great delay, labor should be hastened by the application of the forceps, by the exhibition of ergot, or by other appropriate measures.

Such cases are generally rapid; the hemorrhage will be either moderated or not long continued, and, therefore, the labor is comparatively very favorable to mother and child. Recoveries of the mother in what is termed “spontaneous delivery” being, according to Dr. Trask, forty-three in fifty cases, gives a mortality of fourteen per cent.

If the presentation should be preternatural, or should the pains be moderate, it is very universally advised, in all such cases, to resort immediately to *version by the feet*, in order to hasten the emptying of the uterus, and the consequent arrest of the hemorrhage. In performing this operation, the tampon must be removed, and the hand be carried through the os to the surface of the placenta, and then between it and the walls of the uterus, to that point where the membranes can be most readily perceived. Mutation is then to be accomplished in the usual manner. Some practitioners are contented with bringing the hips of the child to the orifice of the uterus, and then leaving the delivery to the natural powers, supposing that, by this means, the hemorrhage will be arrested, and a better chance be afforded to the infant. It is most generally advised, however, to complete the delivery at once, as prior to this there can be no safety for the mother, and the dangers to the child will not probably be aggravated. The suggestion, often given, and sanctioned by Dr. Radford in cases of central presentations, of perforating the placenta with the hand, should not be followed, as by it the placenta would be still further detached, the hemorrhage increased, delay experienced, the difficulty of turning augmented, and the child would have to be drawn through the orifice in the placenta, or this body would be dragged out with the child. All such perforations would also necessarily be followed by the death of the infant.

The dangers of version by the feet are very great to the mother and child. The woman, already weakened by the loss of blood, would be still further exhausted by the increased flooding necessarily resulting from the displaced coagula and further detachment of the placenta, and also by the pain and irritation necessarily connected with this manual operation. On account of these dangers, experienced practitioners advise that the operation should not be performed, if the patient be in a fainting condition, for fear immediate death would result. Dr. Trask gives the number of deaths where turning had been employed as fifty-nine in two hundred cases, being in the proportion of one in three and four-

tenths, or twenty-nine and a half per cent. Dr. Simpson states that one hundred and forty-four women were lost in four hundred and twenty-one cases of turning; this is one in two and nine-tenths, or thirty-four and three-quarters per cent. These results, if they are to be depended upon, could certainly not have been anticipated, as they show that notwithstanding all the confidence placed by the profession in podalic version, in cases of placenta prævia, yet that the rate of mortality has not been diminished; for, as Dr. Simpson has also shown, out of six hundred and fifty-four cases, "taken irrespectively of any special forms of treatment, or, indeed, of any treatment at all," one hundred and eighty mothers perished, being one in three and six-tenths, or twenty-seven and a half per cent.

Dr. Simpson would deduce from these facts, the conclusion, that *separation of the placenta* would be far preferable to the operation of version. This conclusion, however, cannot be readily sanctioned, inasmuch as version, in all cases of preternatural presentation of the fœtus, is positively demanded, whether the placenta be removed or not; and, according to Dr. Simpson, these mal-presentations occur, as reported by Dr. Churchill, twenty-three times in ninety-one cases; or, as in a table given by Dr. Simpson himself, in ninety cases there were ten breech and footling presentations, and twenty-one of the trunk or upper extremities. The early removal of the placenta, in all cases of mal-presentation, would render the operation of version far more difficult, and occasionally, even impracticable, owing to the powerful contractions of the uterus. The patient, therefore, already exhausted by hemorrhage, would be subjected to the dangerous operation of version, or, it may be, of embryotomy, with a contracted uterus.

Moreover, if the presentation be favorable, and the os uteri dilatable, it is by no means proved that the separation of the placenta would be more favorable for the mother than resorting, as the case may be, to puncturing the membranes, the exhibition of ergot, the employment of the forceps, or, in extreme cases, of the perforator; while, to the child, the removal of the placenta, unless delivery occur within a few minutes, is as fatal as craniotomy itself.

During the second stage of labor, therefore, all these various manual and instrumental modes of hastening the progress of delivery, are at the command of the accoucheur, whose best judgment, skill and experience, will be required to adapt them to the peculiar emergencies of the case under treatment.

There is, however, another modification of the treatment for placenta prævia, recommended by Professor Wigand, of Hamburg, more than thirty years ago,

which has appeared so reasonable to the author, that he has adopted it, as one of the best practical rules in the management of unavoidable hemorrhage.

Professor Wigand recommends that the whole vagina be filled up with shreds of linen, or other soft materials, during the first stage of labor, and that this be secured by a compress and T bandage externally, as usually recommended; but instead of removing it, when the os uteri is dilatable, he advises, when the presentation is favorable, that it should be continued during a portion of the second stage. The contractions of the uterus will usually be sufficient to rupture the membranes, or if this does not occur, they may be perforated, and then the child's head will press firmly upon the placenta and the bleeding surface of the uterus; while the counteracting pressure, against the vaginal surface of the uterus, will be made by the *tampon*. The bleeding tissue will thus be compressed between the head of the child internally and the tampon externally, greatly contributing, and often successfully, to the arrest of the hemorrhage. The bearing-down efforts are to be encouraged, and, if necessary, the ergot be exhibited. The tampon will soon be found distending the perineum and vulva, and portions of it may be gradually removed, as the head descends into the pelvis. If, after its entire removal, the child be not immediately delivered, the labor can be rapidly completed by the forceps.

The advantages of this practice are, we think, great; as,

First. It is in perfect accordance with the natural mode of delivery. It promises, therefore, many of those benefits which we have seen to accrue in spontaneous delivery in cases of placenta prævia.

Second. There is no necessity for the removal of the tampon, and no danger, therefore, of disturbing the external or internal coagula, and thus increasing the hemorrhage.

Third. It secures, so far as the bleeding is concerned, all the advantages derived from rupture of the membranes by the natural contractions of the uterus or by the influence of ergot, and from the internal pressure of the head against the bleeding surface of the uterus; and, at the same time, it affords an additional agent in checking the bleeding, by the pressure of the tampon against the external surface of the cervix uteri.

Fourth. The woman escapes all the dangers and sufferings arising from the operation of version by the feet; there is no increase of hemorrhage from the removal of the tampon and coagula, or from further detachment of the placenta, by the hand of the accoucheur; and no danger, also, from contusion or laceration of the os and cervix uteri. She escapes, also, the

consequent exhaustion from the increased hemorrhage and pain necessarily connected with the operation of version.

Fifth. If this plan can be executed, all the evils which may result from the extraction of the placenta are avoided.

Sixth. The severe and dangerous consequences of forcible delivery through an undilated os uteri are thus evaded.

Seventh. The comparative benefits are as great, if not greater to the child. Extraction of the placenta necessarily endangers the life of the infant, and, in all cases of delay, is fatal: as Dr. Churchill says, the mortality is "fearfully great." While by version, and all other modes of artificial delivery, the deaths are stated at sixty or seventy per cent. We have no statistics respecting the result to the child in deliveries by Wigand's method; but certainly the prognosis would, *à priori*, be far more favorable, as the placental functions will not be interrupted by any agency of the accoucheur, as in cases of version by the feet. Neither will the infant be subjected to any unusual force or pressure; while the hemorrhage is greatly checked, and almost invariably ceases when the head enters the vagina.

This practice is also adapted to pelvic presentations; as, by encouraging the contractions of the uterus, the hips will be forced through the os uteri and against the tampon, so as to distend the perineum, as in cephalic presentations. If, after the removal of the tampon, spontaneous delivery does not speedily ensue, the infant may be removed as in ordinary cases of breech presentation. Of course, this plan is not to be employed in trunk presentations; in which case, version by the head or by the pelvis is requisite.

Many objections may possibly be urged against the plan presented; and, no doubt, great judgment is required in determining its propriety in any special case; and, doubtless, it may be occasionally requisite, from the severity of the hemorrhage, the degree of exhaustion, or other causes, immediately to interfere, remove the tampon, and deliver by version. Nevertheless, in our opinion, it promises, comparatively, very much to the mother and child. We have depended upon it in several cases—not, perhaps, in the worst forms of unavoidable hemorrhage—and always with success to the mother, and, occasionally, to the infant.

In carrying out Wigand's plan, there may be some difficulty in rupturing the membranes while the tampon occupies the vagina. If necessary, however, this can usually be accomplished by a finger passed between the tampon and the neck of the uterus;

and if this be not feasible, a curved canula might be employed, through which a probe or stilette may be directed.

On review of what has been said, it is evident that no exclusive plan of treatment can be adopted, in cases of unavoidable hemorrhage, to fulfil the two important indications presented, of diminishing the hemorrhage, and of completing, as soon as practicable, the labor. Much judgment must be exercised by the practitioner, and by those whom he can consult, in such emergencies. The following general outline, however, of treatment in the present state of our knowledge, as deduced from the facts presented, seems to us the best.

The woman is to be kept at perfect rest in bed, with her hips elevated, and the head low. Her diet should be simple and digestible, and all hot and stimulating drinks avoided during the first periods of the flooding. Cold applications should be made to the uterine region, and warm to the extremities. All mental and moral excitements should be removed as far as possible. The nature of the hemorrhage being ascertained, a soft sponge, previously dipped in cold water and vinegar, should be applied directly over the orifice of the uterus, and be supported by other portions introduced between it and the floor of the pelvis, or, perhaps, by a gum-elastic bag distended with water. If the hemorrhage should continue and the os be still rigid, the employment of the sponge tent or the internal caoutchouc dilator may possibly be advantageous before more decided ulterior treatment be employed. If, however, the hemorrhage be, by these means, diminished, and the patient's strength good, the practitioner should wait until the os uteri be dilatable. Then, if the membranes do not rupture, they should be perforated, and the liquor amnii evacuated. If the contractions of the uterus be not powerful, the ergot should be given in repeated doses, while cold applications should be made to the uterus and rectum. If now the bearing-down efforts be efficient, and the perineum becomes distended, the tampon may be gradually removed, and, if necessary, the forceps be applied to complete the delivery. If the head be too large, or the pelvis small, perforation of the cranium may, in some rare instances, be demanded.

If, unfortunately, these measures do not sufficiently diminish the hemorrhage, and the patient's strength fails, and the labor cannot be rapidly completed, a still further hope remains by at once extracting the whole placenta, either by means of the hand or by some suitable instrument; so that, if possible, the hemorrhage may be arrested and time gained for the patient's system to react, that delivery may be subsequently effected.

If it should be ascertained that the presentation is preternatural, the membranes ought not to be ruptured until the os uteri is dilatable, so that version may be accomplished with less difficulty. In such cases, also, unless the necessity be imperative, the artificial extraction of the placenta should be avoided, as the subsequent operation of version would be more painful and dangerous.

The general treatment of uterine hemorrhage must be regulated by the ever varying condition of the patient. We cannot coincide with those who recommend bleeding from the arm, however plethoric and strong the woman may be. Simple diet, cold and acidulated drinks, with attentions to the bladder and rectum, are sufficient. When, however, the patient's strength begins to fail, nutritious diet, tonics, and very soon stimulants become necessary. Where there is a disposition to faintness and exhaustion, these last must be freely exhibited without any apprehension of increasing the hemorrhage; cold applications should

be abandoned; heat, rubefacients, and all the variety of revulsives should be applied to the surface of the body, especially to the extremities; the head should be kept very low upon a mattress, and sometimes pendant over its edge, or else the lower portion of the mattress, or bedstead, should be much elevated. Ammoniacal salts, or other volatile articles should be inhaled, and often opium and other narcotics be administered, in repeated doses, as stimuli, and also to quiet mental and nervous agitation.

The most assiduous and persevering attentions should never be abandoned; the practitioner should not despair; for, although his hopes will often be disappointed, yet, nevertheless, patients have frequently recovered after long-continued syncope, and even apparent death.

In the third stage of labor, uterine hemorrhage is often severe and fatal. The causes and nature of this variety of flooding will be detailed in the next chapter.

CHAPTER XXV.

DYSTOCIA.—COMPLICATIONS FROM THE MOTHER.—INERTIA AND INVERSION OF THE UTERUS.

HAVING now considered those complications of labor which result from inordinate nervous and vascular excitement, we must treat of those of an opposite character, where the excitement is not adequate to the rapid or even safe progress of the labor. Complications from this cause, although often slight, yet always demand attention, and sometimes call into immediate requisition all the resources of the practitioner.

LABOR COMPLICATED WITH DEFICIENT EXCITEMENT.

A deficient excitement in the muscular powers of the uterus not unfrequently complicates labor. This diminution of action may often exist where the uterine forces are still great; while, in other instances, it constitutes one of the many evidences of the actual loss of power in the uterus alone, or in the general system. The former has very generally been termed a state of *inertia*; the latter a state of *debility* or *exhaustion*. These two conditions are very different as regards their

nature, causes, and treatment. They should, therefore, be carefully distinguished one from the other, both theoretically and practically.

INERTIA OF THE UTERUS.—By this is meant a diminution or a temporary suspension of uterine action, whether tonic or alternate. It is very universally confounded with weakness or debility, from which, however, it essentially differs. The latter implies an actual loss of power or vital force; the former is a mere diminution of excitement—the power, although dormant, still existing. An animal is as strong when at rest or asleep as when it is awake and in motion. This state of quiescence or inertia disappears under the influence of stimuli; the animal at once manifesting its powers in full vigor. This is equally true as regards the individual organs of the body: the uterus may be in a state of great inactivity for a longer or shorter time during labor, and afterward manifest great activity and power. An animal that is weak or exhausted cannot be

roused to any continued or powerful exertion. Under the influence of stimuli, there may be some moderate or paroxysmal manifestations of excitement, but these are temporary, and are followed by increased weakness. If the exhaustion be great, even powerful stimuli may fail in producing excitement. This is also true as regards the uterus, whose powers, after a protracted labor, for example, can be excited very imperfectly, if at all, by any stimulus applied.

Inertia, therefore, or a want of action, although one of the evidences of weakness or exhaustion, often occurs as a complication of labor, where the powers of the uterus are still in a good condition.

Inertia is one of the causes of tedious labor, and, under some circumstances, may render labor dangerous and fatal.

Causes.—These are general or local, arising from some peculiar condition of the patient's system, or of the uterus.

Inertia is very often dependent upon the state of the *cerebro-spinal system*. The influence of the mental and moral affections on uterine action has already been noticed; slight mental disturbances will sometimes excite, and sometimes diminish the uterine functions. Hence, powerful impressions suddenly made on the mind or feelings of a parturient woman, will often immediately diminish or suspend uterine action, and will sometimes be followed by symptoms of hysteria, not unfrequently of a severe character. There would seem to be a transference of irritation from the uterus to the brain.

There are, also, various but not well defined physical conditions of the nervous system, which conduce, in some way, to the diminution of uterine excitement. Thus, in some women, from a peculiarity of their nervous temperament, labor is always slow; and this predisposition is said to be occasionally hereditary. In other instances, inertia, from this cause, exists during one stage of labor, but not in the others; and sometimes it is not manifested until after the delivery of the placenta. In other cases, irritations of the stomach, bowels, etc., may sometimes arrest the progress of labor until such irritations be removed. A distended bladder or even rectum have occasionally been the cause of inactivity of the uterus.

Inertia is also sometimes connected with the *vascular system*. Hence, most authors mention plethora; especially when connected with congestion of the uterine vessels, as one cause of uterine inactivity.

Among the local causes, the most common is a *great development of the uterus* from the presence of two, three, or more children, or from an unusual quantity of liquor amnii. This cause is operative, chiefly during

the first stage, or, it may be, during the first period of the second stage of labor.

Fatigue may, also, be mentioned as a cause of inertia: the uterus may act very regularly and powerfully for a longer or shorter time, and then there is a great diminution or cessation of its contraction, even for hours; after which vigorous contractions will be resumed. Frequently, labor will commence very naturally, but the symptoms may soon disappear for twelve or twenty-four hours, and then the phenomena of regular labor will ensue. So, also, during the second stage of labor, there may be a similar diminution and recurrence of excitement. This torpid condition of the uterine functions is more frequently met with during the third stage of labor, and yet, under the influence of stimuli, the uterus will again contract powerfully, showing that there is no great loss of vital power, but simply fatigue.

Dr. Tyler Smith states that inertia is not uncommon when labor occurs in young girls, whose "nuclear muscular structure" is not fully developed; and also in multiparous women, where the uterine muscular structure is "degenerated," having been developed and re-developed many times in a few years. This explanation is by no means satisfactory, as energetic contractions of the uterus are very common in both of the cases above-mentioned.

Inactivity of the muscular fibres of the uterus may possibly be connected with some *organic lesions*. Authors allude to the existence of tumors in the walls or substance of the uterus, of the increased thickening or induration of its tissues, and of inflammation as productive of uterine inertia.

Varieties.—It has already been mentioned that inertia may involve the *tonic and active contractions* of the uterus, both of which may be simultaneously involved. This is very frequently observed during the third stage of labor, where the womb not only ceases to contract actively, but becomes perfectly soft and flaccid. During the first and second stages of labor, the tonic contractions very generally continue, although the alternate contractions may be diminished or suspended.

There can be no doubt, also, that this inertia, very often, interests chiefly the *circular fibres of the cervix and os uteri*. These yield very readily, in some instances, to the action of the longitudinal fibres; they may be in a state of comparative relaxation, directly opposed, therefore, to that increased excitement known as rigidity of the cervix. Thus, in many women, often in perfect health and strength, the os uteri dilates almost insensibly; an examination per vaginam, or a rupture of the bag of waters, or, it may be, a sudden bearing-

down effort, causing a descent of the child, give the first intimation of labor. We hear, therefore, of "very rapid" or "precipitate" labors, lasting for a few minutes, or for an hour; of women being delivered during their sleep, or suddenly arrested by the process of labor, while occupied with their usual avocations. In all such cases, there must, of course, be a corresponding relaxation of the tissues of the vagina and perineum. These precipitate labors are far more common in multiparous women, but occasionally labor is very short and easy also in primiparæ. We cannot agree with authors who are disposed to refer such deliveries to energetic expulsive contractions; our experience would indicate that it is not from the increase of power, but from the diminution of resistance. Hence, in consumptive patients, in women who are weakened by other diseases, or are even in a dying condition, labor, although unaccompanied with much bearing-down effort, is rapid and easy. The above explanation is confirmed by the remarkable fact, that children have been born, even after the death of the parent; the relaxation of the tissues of the cervix and vagina being then so complete, that the slight uterine contractions, which occur after death, are sufficient to expel the infant. It sometimes happens, during the second stage of labor, that, although there is a great diminution or suspension of the alternate contractions of the uterus, yet, as the voluntary efforts are strong, they often serve to accomplish delivery very rapidly, the uterus being passive. There are, however, many cases where there is a conjoint inertia, both of the voluntary and involuntary actions. We have known, for example, the os uteri perfectly dilated, the head in the vagina, and the external tissues relaxed, yet the uterus inactive, and the bearing-down efforts, although existing, were not sufficiently powerful to expel the child. At every voluntary effort of the mother, the uterus and the child would descend, but, on the suspension of this effort, both would immediately recede as if constituting one mass. In another case, a lady whose labors were generally very rapid, but who was unfortunately impressed with the idea that she would die during labor, became so hysterical that the action of the uterine and of the abdominal muscles was entirely suspended, although the os was dilated, and the child's head low in the vagina. Analogous cases of a partial or total inefficiency of the abdominal muscles and diaphragm will hereafter be detailed, when speaking of the pathological states of the mother.

Symptoms.—The characteristic phenomenon of inertia is simply the diminution or suspension of uterine contractions—sometimes of the alternate contractions alone, and sometimes of both the alternate and tonic.

The consequences, however, of this want of activity in the uterine fibres, vary in the different stages of labor.

During the *first stage*, the whole process of dilatation goes on very slowly; the patient may be conscious of some unusual sensations, uneasiness, occasionally amounting to pain, and perhaps of hardness of the uterine tumor; but she can hardly determine whether there are regular contractions. In other instances, the pains are more decided, but of short duration, and the intervals are long.

On examination per vaginam, the os uteri may sometimes be found very relaxed and open, occasionally fully dilated, almost without a suspicion of labor being excited. More frequently, the os is found partially dilated, its edges soft, and but slightly tense on the accession of a pain. Hours, and sometimes days, may elapse before full dilatation is accomplished. Women are reported as being six or eight days in labor, with very little suffering under these circumstances.

The general symptoms are seldom of any consequence. The woman feels as well as usual, her circulation is good, and, except for the mental anxiety and nervous symptoms generated by the tediousness of the process, she would be perfectly well; the child, floating in the liquor amnii, and free from pressure, is also safe.

During the *second stage* of labor, the process is also tedious: for, though the os uteri be dilated, the contractions of the uterus are often not sufficiently active to rupture the membranes; or, even if they be ruptured, the child advances very slowly, and if no assistance be rendered, the second stage may be indefinitely prolonged. After the evacuation of the liquor amnii, the pains become active, but occasionally "die away" for a longer or shorter time, and then return with more or less efficiency. Such changes may continue to recur until the child is delivered. As formerly intimated, the pains may be very active from the commencement of labor, but, when the head reaches the perineum, may, from various causes, cease, and afterward, under the influence of stimuli, become very efficacious. The general system of the patient is in a good condition. Nevertheless, the tediousness of the labor, or the disappointment of a speedy termination, excites the suspicion that there is something wrong, or that there is some deformity or other complication of labor. Hence, the woman becomes nervous, restless, often impatient, or even irritable; seldom, however, any bad consequences result.

Under the head of inertia, authors have, incorrectly in our opinion, detailed very bad consequences as resulting to the child and the mother. Where there is merely a want of efficient action, the child and the

tissues of the parent may be regarded as comparatively safe; but if the labor be slow and tedious from resistance of the os uteri, or from obstructions in the vagina or pelvis, etc., then the child and the mother will be in imminent danger. The danger, however, arises from the obstructions to the delivery, and not from inertia of the uterus. If this should be present, it is only an additional complication.

In rapid or precipitous labors, where, with great relaxation of the cervix uteri and of the perineal tissues, the bearing-down efforts of the mother are comparatively active, the dangers to both mother and child are greater than in ordinary cases of inertia. The sudden fright to the mother may induce faintness, or may excite nervous and hysterical symptoms; and the uterus, being suddenly emptied, may fall into a state of inertia followed by flooding. This last would supervene more readily if the placenta had been prematurely dragged from the uterus by the fall of the child, as when the woman had been in an elevated position. Even inversion of the uterus might be the result, if, under the same circumstances, the placenta had been adherent to the upper portion of the uterus. The dangers to the child may be great from its immersion in a large quantity of the liquor amnii and blood after its delivery, from the sudden separation of the placenta, from the rupture of the umbilical cord, or even from contusions consequent upon its falling from its mother.

These accidents from precipitous labors are, however, exceedingly rare. In our experience, such labors are productive of little or no mischief. We have found the tonic contractions of the uterus to ensue rapidly, and, of course there has been little disposition to inertia or hemorrhage post-partum. Neither have we observed any peculiar disposition to syncope arising from the sudden collapse of the abdominal swelling. Even the fright to the mother and the disposition to hysterical affections are greatly counteracted by the delightful consciousness that labor is complete, and that she and the infant are in a good condition.

During the *third stage* of labor, the whole aspect of the case changes; if inertia ensues, after the birth of the child, there is very universally a suspension of the tonic as well as of the clonic contractions of the uterus. This state is indicated by the disappearance of the firmness of the globular tumor of the hypogastric region, which now feels comparatively soft and yielding. Generally, the outlines of the uterus may be indistinctly perceived; but sometimes its tissues are so soft, that they can, with difficulty, be recognized through the walls of the abdomen. If the patient be lying upon her left side, the now flaccid uterus may

slide from the hypogastric into the left lumbar region, elongating the vagina.

The practitioner is usually advertised of this condition of the organ by a profuse flooding—*post-partum hemorrhage*—the blood flows in torrents into the vagina, and externally, so that, in a few moments, the patient becomes weak and faint; and, if the hemorrhage continue, death will soon result, preceded by the usual symptoms of loss of vision, giddiness, shortness of respiration, jactitation, cold and pallid surface, and failure of the pulse. Patients have thus perished in a few minutes after the occurrence of complete inertia.

Where the inertia is partial, the symptoms are less urgent; nevertheless, the discharge is profuse, and although occasionally intermittent, recurs again and again, until the patient is exhausted, if proper assistance be not rendered. The discharge is sometimes so rapid, that few coagula form before the blood is effused upon the bed. Generally, however, large masses of clots are formed in the vagina, greatly distending this passage. Sometimes they exist in the cervix uteri, and occasionally, especially in fatal cases, they are found in utero.

Contrary to what is observed in every other variety of hemorrhage, coagula formed during inertia, in the third stage of labor, have no influence in arresting hemorrhage: they rather increase it, for by distending the vagina, the cervix, and the body of the uterus, they prevent the natural tendency to contraction, and thus keep open the orifices of the venous sinuses, of course augmenting the discharge, until the woman becomes perfectly exsanguinous. The hemorrhage, in such cases, can only be arrested by the contractions and the condensation of the uterine tissues.

The presence or absence of the placenta has usually little influence on the hemorrhage, provided it be detached from the internal surface of the organ. If it be still in utero, and partially adherent, it is supposed that the flooding will be less, as some of the venous orifices are still covered by the placenta. Hence, also, occasionally, where it is completely adherent, there is but little hemorrhage, although inertia exists. The retention of the placenta in utero after its detachment is sometimes the cause of great mischief; as it may fall over the os uteri, covering it so completely, that no blood escapes, while large quantities of this fluid are poured forth from the venous vessels. The uterus is thus passively distended, sometimes to an enormous size; the patient may even perish before the attendants have suspected danger, as there is no external flow of blood. This "occult hemorrhage" sometimes depends, not upon the placenta, but upon the presence of

coagula, blocking up the vagina and os uteri, and hence may occur after the placenta has been removed, the uterus distending, and the patient sinking, when there is but slight manifestation of hemorrhage per vaginam.

There is, of course, every variety and degree of this "post-partum" hemorrhage, depending upon the extent of the separation of the placenta, the degree of inertia, the presence of the placenta, and the quantity of coagula which may form. The effects also must vary according to the strength or the plethoric condition of the patient; some bearing the loss of large quantities of blood with comparative impunity, while others sink under trifling discharges.

Inertia does not always come on immediately after the delivery of the child, and sometimes is delayed until after the delivery of the placenta. The woman, for some fifteen or thirty minutes, and even longer, may seem perfectly well, the uterus is contracted and firm, the practitioner's mind is relieved, and he regards his patient as safe, and perhaps may be tempted to leave her. Often, under these circumstances, relaxation commences, blood flows, and large coagula form in the vagina, with perhaps a moderate discharge externally. The woman complains of pains in the lower part of the abdomen, in the sacral region, and also at the floor of the pelvis. This sensation is sometimes very distressing, greatly disturbing her nervous system; she becomes weak, restless, her hands and feet are cold, and there is a disposition to sighing, with oppression. These symptoms, although they may continue for some time, are indicative of great danger, and may rapidly increase to a fatal result. Even when relieved, and the coagula have been expelled, and the uterus contracted, they may return repeatedly.

Let it be observed, also, that even if there be little return of the hemorrhage, a disposition to faintness and to sinking may continue for hours afterward, sometimes from pure exhaustion, but, no doubt, occasionally from peculiar states of the nervous system; for, when reaction occurs, patients often feel very well, without subsequent debility.

These attacks of hemorrhage after delivery are often preceded by coolness or pallor of the surface of the body, especially of the extremities, while the patient's pulse is full, slow, and comparatively strong and labored. In such cases, we have often noticed hemorrhage to occur within the first hour or more after delivery. Indeed, no woman can be regarded as safe, after labor has terminated, until there be complete reaction of her system, until the extremities and surface become warm, with an active capillary circulation, and a soft, natural pulse; not full, or labored on the one

hand, or small, weak, and frequent on the other. The uterus, also, must remain firmly contracted, in the hypogastric region, and not extending more than half way to the umbilicus, while the os uteri should be firm and rigid; and no coagula exist in the vagina or cervix uteri.

The *source of uterine hemorrhage*, after delivery, is almost exclusively from the orifices of the venous sinuses of the uterus, which remain patulous so long as the uterus does not contract. That this hemorrhage does not come from the placenta is proved by the fact, as declared by Dr. Rigby, that the greater the separation, the more severe the flooding: the reverse would be true, if the bleeding came from the placenta; for then, the greater the detachment, the smaller quantity of blood would reach the placenta, through the uteroplacental arteries. It is also found that when the placenta is completely separated, the hemorrhage is greater than when partially detached. In our experience, the most profuse post-partum hemorrhages are after the removal of the placenta. Such hemorrhages, moreover, can only be arrested by the contractions and the condensation of the uterine tissues.

In cases where inertia of the uterus ensues during the third stage, and where the delivery of the child has been accomplished with difficulty, the hemorrhage may be augmented by ruptures of the blood-vessels of the cervix and os uteri, or of the vagina and perineum; indeed, in many cases of difficult labor, these last constitute the sole source of flooding, which may be serious in its consequences, although the uterus is firmly contracted.

Secondary uterine hemorrhages occasionally appear many hours, days, or even weeks after parturition. Many of these depend upon accidental circumstances, such as the existence of ulcers, polypi, and fungous or cancerous growths. As connected, however, with labor and its consequences, these floodings usually result, first, from a retention of portions of the placenta, or membranes, or of coagula within the uterus; the patient is never safe from hemorrhage as long as such sources of irritation remain. Second. Bleeding may recur from partial relaxation or want of tonic action of the tissues of the uterus, even after the contractions of the organ have been firm. This cause is often mentioned by authors, but probably is very rare. Thirdly. The most common cause of such floodings is vascular congestion, which congestion may arise from various circumstances, such as mental, moral, or other nervous excitements, or from general plethora; also from local irritations, such as displacements of the uterus, inflammations and ulcerations of the os uteri or of the vagina, sympathetic irritations from the ovaries, bladder, rec-

tum, liver, stomach, small intestines, etc. Occasionally, also, congestion of the uterus results because the mammary excitement is deficient.

These secondary hemorrhages are seldom, therefore, profuse, and, although indicative of mischief and debilitating in their influences, are rarely dangerous.

There is still another accident which may result from inertia of the uterus during the third stage of labor. This is a partial or complete *inversion of the uterus*, the fundus of the womb descending and often protruding through the os uteri, and even through the vulva, so that the womb "is turned inside out." The mucous surface being now external, while the peritoneal surface becomes internal. This is an accident of so serious an import as to demand a separate consideration.

The important indication in the *management of all cases of inertia* is to increase uterine contractions by indirect or direct measures. The treatment must, however, be modified, as this accident occurs in the different stages of labor.

Treatment during the First Stage of Labor.—As the mother and child may be regarded as safe until the os uteri be dilated, there is seldom much necessity for medical assistance. The mind of the patient should be tranquillized by very favorable representations of her case, and any nervous excitements palliated or removed by antispasmodic or anodyne medicines. In a few instances where plethora exists, moderate bleeding will prove very efficient in hastening uterine contractions. Care should be taken that the bladder be not distended, and that the rectum be regularly evacuated. The patient may be allowed to walk about at pleasure, avoiding, however, all muscular exertion and disposition to strain. If the bowels be constipated, a laxative of castor-oil, of rhubarb, or of fluid extract of senna will prove very advantageous, not merely by emptying the bowels, but still more by sympathetically affecting the uterus. With the same object, rectal enemata of infusion of senna, solutions of the salts, aloes, and other stimulating articles, may be found useful. Also, the vaginal douche of warm water, sometimes alternating with cold water, may be employed. Gentle frictions over the abdomen with the hand alone, or with oleaginous and stimulating liniments, are generally agreeable to the patient, and accelerate uterine action. Draughts of cold water or warm drinks of tea, coffee, mint, pennyroyal, etc., have often a very decided influence, and may be used without fear of danger; but all powerful stimuli should be carefully avoided.

Examinations per vaginam and, occasionally, the introduction of the finger within the os uteri, may accelerate the process of dilatation, care being taken not to

irritate the tissues or to rupture the membranes. In all cases the patient must be encouraged with the hope of an easy and safe delivery and by well regulated and cheerful conversation: but time and patience are always demanded.

Treatment during the Second Stage of Labor.—During the latter portion of the first stage the woman should be placed in bed for fear there might be a sudden rupture of the membranes, and a too rapid delivery of the infant. If the os uteri be, however, fully dilated and the uterus inactive, the *membranes should be ruptured*, that the liquor amnii may be evacuated. The tonic contractions of the uterus will very universally succeed, and, in most instances, the expulsive actions will be excited, and all symptoms of inertia will vanish. This is in accordance with the general principle that the contractions of the uterus are inversely as the size of the organ. As inertia, therefore, often arises from distension, uterine action ensues when this cause is removed. In cases of compound pregnancy, also, the alternate contractions of the uterus are increased by the rupture of one ovum, although the other remains intact. After the membranes have been ruptured, it sometimes happens that the liquor amnii is but imperfectly discharged, as the head of the child occupies the orifice of the uterus. This may be easily obviated by gently elevating the head by means of the finger at the commencement of a pain, so as to allow the free discharge of the waters.

After the uterus has been thus diminished in size, the patient should be encouraged to make the usual *bearing-down efforts*, which will not only facilitate the descent of the child, but will serve to stimulate the uterine actions. If these still be inefficient, some advantage will be gained by passing the finger within the verge of the os uteri in different directions, and also by slight occasional tractions upon its margin. Should inertia continue, the treatment already advised during the first stage, will often be important. Attention should, therefore, be paid to the nervous and vascular systems, to the condition of the stomach, bowels, bladder, etc., while more direct stimulation may be given by the exhibition of cold or hot drinks, by frictions to the abdomen, and by enemata. Something is often gained, also, by the patient changing her position from the side to the back, and occasionally, it may be, to the sitting posture. It is dangerous, however, to allow her to stand or walk in these states of inertia, after the os uteri has been dilated.

These measures are fully adequate to excite the uterine functions in ordinary cases of inertia; but, occasionally, more powerful measures are required, and

various "oxytocic" means have been recommended to excite efficient uterine contractions.

Ergota, or the *secale cornutum*, is far more efficient than any other medicine yet proposed to excite uterine contractions. It was long used, especially in Germany, where it was termed "mutterkorn," as a popular medicine to hasten labor. To Dr. Stearns, of Saratoga County, New York, however, the profession is indebted for its first introduction into regular practice. His letter, detailing his observations, and its nature and influences, was published in the eleventh volume of the New York Medical Repository for 1807. Its wonderful effects on the uterus, during parturition, were found to be so decisive, that its value was greatly extolled, and the opinion was entertained that it would prove, very universally, a substitute for the forceps. These high-wrought expectations have been sadly disappointed; and its indiscriminate use has been productive of so much mischief, both to mother and child, that many practitioners have entirely abandoned its employment, and its friends now restrict it to a few specified cases of tedious labor.

We have already mentioned, the peculiar effects of ergot when exhibited during labor: it usually excites strong and powerful contractions of the uterus, both tonic and clonic, accompanied by violent bearing-down efforts. These contractions, although alternate, are very persistent, and the intermissions are comparatively of short duration. Hence, the pressure on the child is not only very great, but almost continuous, forcing it, therefore, very rapidly, if there be no great resistance, through the pelvis and vagina, accelerating, also, the rapid delivery of the placenta, and arresting any disposition to post-partum hemorrhage. Should, however, any resistance to the ready descent of the child exist, these energetic contractions must be, and have been, productive of the most dire consequences; the compression of the child, the cord and placenta becomes so great and persistent, that the infant will soon perish. Deaths, from this cause, have been so numerous, that the supposition was excited that the child was poisoned by the ergot. This opinion has, however, not been confirmed. Drs. McClintock and Hardy, aware of the danger to the infant, have advised that if, by auscultation, it is perceived that the pulsations of the child's heart are becoming more feeble, delivery should be immediately effected by the forceps. To the mother, under the same circumstances, great mischief has also resulted. The powers of the uterus, and sometimes those of the general system, have been greatly weakened or exhausted by the continued suffering, and violent exertions; or lacerations of the perineum and vagina, of the os uteri, and of the body

of the uterus, have occasionally ensued. In every case of rupture of the uterus, which the author has witnessed, with perhaps one exception, the *secale cornutum* had been administered.

It should be remarked that if this diseased rye be taken in large quantities, and, especially if long employed, symptoms of dry gangrene of the extremities, or of typhoid, or malignant fever have appeared. Epidemics of this kind are recorded as having occurred in Europe, especially in France. In doses of one or more drachms, it is regarded, by many, as having a sedative, or even a narcotic influence on the general system.

During labor, the dose of ergot is fifteen or twenty grains, given either in powder, infusion, or decoction. It may also be administered in the form of the "wine of ergot," in doses of one or two drachms. Twenty grains of the powder, infused for a few minutes in hot water, will, in the course of ten or fifteen minutes after its administration, usually produce the specific influence on the uterine fibres, without any apparent disturbance of the nervous or vascular systems, or of the functions of any other organ of the body. No pain or bad consequences, after the delivery of the placenta, remain. Occasionally, some slight nausea results from its use. The dose must be occasionally repeated in the course of half an hour; but if no influence be exerted, after two or three repetitions, it ought not to be persevered in. The late Dr. Holcombe, of Allentown, New Jersey, in a letter to Dr. Dewees, says, that the fatal effects attributed to ergot may be obviated by giving this medicine, in doses of two or three grains, occasionally, so as moderately to excite the uterus, and that thus no injury is sustained by the child.

From the above statement, the advantages and disadvantages of ergot, during parturition, may be readily estimated. Certainly, no prudent practitioner would administer it, unless he felt satisfied that there was no mechanical resistance to the passage of the child, and that two or three strong bearing-down efforts would accomplish the delivery. It should, therefore, never be given during the first stage of labor; very rarely, if ever, to a primiparous woman, or in cases of mal-presentation or position of a fetus, or of rigidity of the os uteri, vagina, or perineum; and, of course, in no case of disproportion between the head of the child and the passages of the pelvis. On the contrary, if the os uteri be perfectly dilated, the membranes ruptured, the presentation favorable, and if relaxation of the perineum has occurred, there can be no reasonable objection, in most cases, to the administration of this specific. In this city, after the publica-

tion of Dr. Stearns' letter, it was very generally employed by the profession, under the sanction and example of both Drs. James and Dewees, for many years. From its mischievous influences, however, its reputation has gradually declined, and it is now comparatively seldom exhibited during the second stage of labor. Dr. Meigs says he never gives it for its expulsive power; and we must coincide with him in the declaration that the forceps are preferable for this purpose.

Many other oxytocic medicines have been occasionally recommended to the profession; but most of them are so inefficient and so little employed, that they need not be enumerated. Sub-borate of soda is still employed by the German practitioners in doses of five or six grains, according to Lobstein, every half hour, with advantage. Dr. Radford, of Manchester, speaks of it favorably, but gives it in combination with ergot.

Electricity, Galvanism, Electro-Magnetism, have severally been employed as stimulants to the uterus. In 1803, Herder recommended electric shocks; and in 1844, Dr. Radford, of Manchester, employed galvanism in uterine hemorrhage after delivery. Dr. Churchill reports thirty-three cases of its employment, in twenty-five of which it was considered as useful. The experiments of Dr. Simpson with the same agent were not satisfactory; he says "it cannot in any degree be relied upon," and "is entirely useless as a stimulant." Dr. Keating reports several cases from the Philadelphia Hospital, (Blockley,) in 1846, stating that although uterine action was excited by galvanism, yet it was irregular, and not expulsive; and that, in one case, an hour-glass contraction of the uterus ensued after the birth of the child. Dr. Stein and Dr. Kilian have used galvanic forceps, the branches being made of different metals. Dr. Kilian confesses, after six years' experience, that there were no good results. M. Cazeaux reports that Dr. Franck, of Wolfenbitten, employs electro-magnetism, but M. Cazeaux doubts its efficacy.

Delivery by the forceps, in all cases where inertia exists, and the child presents either the vertex or the face, is, in our opinion, far more efficient and safe than any oxytocic remedy. As to its efficiency there can be no doubt, as it is often successful where the most powerful contractions of the uterus, even after the ergot has been given, are unavailing. As to its safety, it is a power entirely under the control of the operator, who can determine exactly when it is to be used, and can, with the greatest precision, regulate its influence, or at any moment suspend its employment according to circumstances. As but little power is required in these cases of inertia, the child is not

injured in any degree by the instrument; so that its life will not be jeopardized, as is often the case when the *secale cornutum* has been administered. The comparative advantage to the mother is equally great; the delivery is sooner effected than by the ergot, and the woman escapes the severe suffering and the consequent exhaustion, as well as the dangers of lacerations of the perineum, vagina, and uterus, which have too often resulted from the administration of the ergot.

Many years have now passed since the author has, in every case, employed the forceps as a substitute for oxytocic remedies during the second stage of delivery, when the uterus is inactive. The only caution he would give, is that the delivery should not be too rapid, and that the tonic contractions of the uterus should be assisted as the child is withdrawn.

Where *the child presents the breech*, in those cases of inertia which continue after rupture of the membranes, and the employment of the usual remedies, delivery may be assisted, either by the fingers, fillet, or blunt-hook, acting on the groin, or the feet may be brought down, so that traction can be made, if necessary, on the body of the child.

In shoulder presentations, version by the vertex may often be accomplished by internal or external manipulations, or recourse may at once be had to version by the feet.

In precipitous labors, should the practitioner happen to be present, the recumbent position should be immediately enjoined, and the patient exhorted to resist any strong bearing-down effort, while the practitioner may, by slight pressure, somewhat retard the progress of the child, so as to secure the tonic contractions of the uterus. These cases of great relaxation of the cervix uteri and perineal tissues, even where the expulsive actions are moderate, demand no assistance. Measures should, of course, be adopted to prevent subsequent inertia, and hence uterine hemorrhage, during the third stage, as will be presently mentioned.

Where inactivity of the uterine fibres and of the abdominal muscles result from any great *mental or nervous excitement*, the labor may be finished speedily, with the use of ergot, or better by the forceps; but in many of these instances a full dose of opium or partial anæsthesia will so quiet the nervous exaltation, that labor will resume its natural course.

Treatment during the Third Stage of Labor.—There is probably no complication of labor in which the life of the woman so much depends on the presence of mind, skill, and resources of her medical attendant. *Uterine hemorrhage*, during this stage, is very common, and is often so profuse as to be speedily fatal. Nature's usual mode of arresting hemorrhage, by the

formation of coagula, is here altogether unavailing. Everything depends upon the accoucheur: with his assistance, the mother will generally survive; without it, she will usually perish. As such accidents are sudden and unexpected, there will be no time to call for assistance or consultation; the obstetrician should be prepared to act instantaneously and decisively.

As floodings during the third stage not unfrequently occur in the same woman, in different labors, much may be done to *prevent* them. Hence, care should be taken that the child is not delivered too hastily, and that the regular contractions of the uterus ensue for its expulsion, the practitioner avoiding all unnecessary traction. He should also, after the head has been born, be in no haste to deliver the body of the child, but wait for the recurrence of the bearing-down effort for its expulsion. As soon as the infant is born, the hand should be placed over the fundus of the uterus, so as to make firm pressure on this body, pushing it downward, toward the superior strait. This pressure, accompanied with gentle frictions, should be continued until the whole organ contracts firmly in the hypogastric region. To secure this contraction still more effectually, it is advisable to give fifteen or twenty grains of ergot, a few minutes before the child is delivered. This is recommended by most practitioners, and we have found it apparently advantageous; but, in many instances, floodings have nevertheless supervened.

If the patient be nervous or hysterical, there can be no objections, we think, to the moderate use of opium, or of the inhalation of ether; although this practice has been opposed as liable to favor inertia. It should, of course, be restricted to decided cases of nervous excitement, where there is no loss of power in the uterus and general system of the patient.

If inertia occurs, the important indication is to excite uterine contractions, for the expulsion of the placenta and of coagulated blood, and for the arrest of the hemorrhage by closing the patulous orifices of the venous sinuses.

This indication is to be fulfilled by various means. One of the most important has already been frequently mentioned, of placing the hand over the fundus of the uterus, so that, by firm *pressure and frictions*, to insure the condensation of its tissues and the closure of its cavity. There are few agents more effectual than this external manipulation. The patient should be placed upon her back; and the practitioner should be careful that the relaxed uterus does not slide on the side of the spine toward the right or left iliac fossa, and that his hand really, through the medium of the relaxed muscles of the abdomen, embraces the fundus of the uterus.

While making this external manipulation, one or two fingers should be carried into the vagina, so as to hook out any coagula which might be present, and which might form a barrier to the uterine discharge. If the placenta be found in the vagina, it should be immediately removed, this process being assisted by the pressure of the hand on the abdomen as well as by the bearing-down efforts of the mother. Should the placenta be in utero, and the body of the uterus have contracted, some time may be allowed for its expulsion. If, however, the uterus remain relaxed, no time should be lost, but the practitioner, while supporting the uterus externally with one hand, should pass the other through the vagina, *into the uterus*, following the umbilical cord as a guide. If the placenta be found detached, it should be embraced by the hand of the practitioner, the fingers being kept extended; and when the uterus contracts, it may be slowly and carefully extracted. Such extraction is often followed by a cessation of the hemorrhage, and by a free discharge of coagulated blood, affording great relief to the sensations of the patient. If, on introducing the hand into the uterus, the organ does not contract, the placenta must not be removed, until, by the irritation of the hands, internally and externally, this desirable object be obtained. So also, if the placenta be partially adherent, there should be no hasty attempts at removal; but pressure should be made on the placenta and on the uterine surface to promote its spontaneous separation. Should the placenta be adherent, gentle attempts should be made, as formerly directed, to destroy its adhesions after, but not before, the uterus contracts. If the adhesions be very close, the mass of the placenta may be torn and removed, leaving the diseased portion still adhering.

The introduction of the hand into the uterus is always exceedingly painful, and, of course, very alarming to the patient, who can hardly be convinced that the greatest mischief will not result. The practitioner, therefore, must be firm, and steadily perform his unpleasant duty, as tenderly and carefully as possible. The pain and irritation excited by the operation are, however, very advantageous, securing, almost universally, at least for the time, the contractions of the muscular fibres, and thus stopping the hemorrhage. The external frictions should, however, be continued after the removal of the placenta, and frequent examination be made, by the fingers, per vaginam, to detect and remove any coagula which may form. The inertia of the uterus often, however, returns, although it is very seldom, after having been once completely emptied, that the organ distends to any great degree; but, nevertheless, the loss of blood may be so great as often to produce syncope and exhaustion.

To maintain the uterine contraction, and prevent the return of the flooding, other agents will be found useful, in addition to the external pressure and frictions. Of these, *cold* is very important. Cloths wet with cold vinegar and water may be laid over the hypogastric region, and be frequently replaced; or pieces of ice, enveloped in cloths, may be applied. Many have recommended that the abdomen be exposed, and a stream of cold water be poured on it from a height. This, doubtless, will be useful, but not more so than the local application of the ice, and certainly it is very objectionable, as deluging the bed of the patient, upon which she must lie for some time after delivery. Cold water may also be applied to the vagina and mouth of the uterus by means of a syringe; but it would be wrong, we think, to inject it into the cavity of the uterus, as has been suggested by Dr. Tyler Smith. Our own practice consists in introducing a piece of ice, covered with a cloth, into the vagina, and there allowing it to melt, when, if necessary, another can be reapplied. This, we think, is by far the most efficient mode of employing cold in post-partum hemorrhages. Much advantage, however, is gained by iced acidulated drinks, which, generally, may be freely exhibited. Injections of cold water to the rectum are also useful. It has been proposed to inject the blood-vessels of the cord with cold water, under the idea that if the placenta be adherent, a very direct impression will be made on the uterine surface through its membranes. This must be inefficient at best, and precious time would be lost in all such attempts.

In the West Indies, and other warm climates, it is customary, in order to procure and maintain the contractions of the uterus, that a *lemon*, deprived of the rind, be pushed into its cavity. A piece of sponge, dipped in *vinegar*, as advised by Velpeau, answers a similar purpose. In a few obstinate cases, they may be employed, although, as a general rule, the introduction of all such acrid matters within this organ should be avoided. As the injection of powerful astringents, whether vegetable or mineral, into the cavity of the uterus, may prove irritating, giving rise to metritis, phlebitis, etc.

The *secale cornutum* has been strongly recommended, and frequently employed in post-partum hemorrhages; and there can be no objection to its administration. No one, however, ought to trust exclusively to its influence: the woman may perish before there is time for it to act, and, moreover, in these cases, it is often inefficient; no perceptible pain or contractions can, in many instances, be traced to its employment.

Galvanism and *electro-magnetism*, as we have

already intimated, have been recommended by Dr. Radford in floodings after delivery; but it appears to be decidedly less valuable than any of the measures already mentioned.

Pressure upon the aorta has been resorted to by M. Cazeaux and others, to diminish the flow of blood to the pelvis, and thus to obviate the disposition to uterine congestion and hemorrhage. Care should be taken to avoid pressure upon the ascending vena cava. This measure is said to be efficient, but certainly cannot be relied upon with any confidence, and must be regarded simply as an occasional adjuvant.

Many English obstetricians recommend, in case of inertia, both before and after the delivery of the child, that a *bandage* should be applied around the abdomen. Very little good can result from this practice, and we agree with Dr. Ramsbotham, that so long as hemorrhage continues, nothing is comparable to pressure from the hand, which can be applied directly to the body of the uterus.

Careful attention to the rules above detailed will enable the practitioner to control almost every case of post-partum hemorrhage, even if such hemorrhage has been partially or entirely concealed, provided, of course, the powers of the patient have not been too much exhausted before remedial measures are adopted. Hence, the necessity, so often urged, for securing the contractions of the uterus, immediately after the birth of the child; and hence, also, the importance of the rule that the practitioner should not leave his patient for at least an hour after delivery, indeed, until reaction has occurred, and her safety has been secured.

The symptoms of "*occult hemorrhage*" are sufficiently decided, and no practitioner should allow himself to be surprised by the occurrence of blindness, faintness, and other symptoms of exhaustion. These should always be anticipated, and, as far as possible, prevented. One hand should be applied externally to the uterus, and the other be immediately introduced into the vagina, so as to scoop out all the coagula present; then the hand should be carried into the uterus, so as to push up the placenta, that it may not impede the flow of the blood, and to stimulate the uterus. As soon as the organ contracts, the placenta and coagula should be withdrawn with the hand, so as to ensure the complete emptying of the uterus. It often happens that the hemorrhage seems to be suppressed, or, at least, to be very moderate, and the uterus apparently contracted. The practitioner may be deceived by this delusive calm, and may leave his patient. In an hour or two he may be summoned, and find his patient exhausted or dying. There may have been no great distension of the uterus, but the flow of blood has been so

constant, that large masses have collected in the vagina. Relief can only be afforded by the instantaneous removal of these coagulated masses, and a resort to the measures already indicated to arrest the further flow of blood.

The general treatment, during the existence of uterine hemorrhage in this third stage, must vary exceedingly. As soon as the patient feels weak, stimuli become necessary. Draughts of cold water, with port wine or brandy, are among the most important. The exhibition of camphor, ammonia, and opium are all advantageous, and there is no danger that they will augment the inertia: and they are very important to quiet the nervous system, and are very efficient as stimuli to promote reaction. Should vomiting take place, as often occurs, it is useful, greatly contributing to this reaction; thence, some authors have proposed the exhibition of ipecacuanha to excite emesis. This is seldom proper, unless the stomach be loaded with acrid ingesta.

Much attention should be paid to maintain the warmth of the extremities by dry heat, frictions, sinapisms, and other rubefacients.

If the faintness be protracted or continue to return, some mild nourishment, in a fluid form, must be administered at short intervals. This disposition to syncope often remains for hours after the hemorrhage is arrested, keeping up the anxieties of the practitioner and attendants. It is seldom, however, dangerous, and when reaction ensues, no bad consequences result; the patient often feeling very well, and in good strength and spirits.

After the flooding has been arrested, a compress and bandage must be applied over the abdomen. Everything wet should be carefully removed from the body and limbs of the patient with the least possible disturbance. Warmth should be applied to the extremities, and blankets be thrown over the patient. Nevertheless, hemorrhage may return; hence, the practitioner should remain with his patient, and occasionally examine the condition of the uterus, and, what is even more important, he should ascertain if any coagula form in the vagina, and if so, carefully remove them. It is in such cases that a teaspoonful of the wine of ergot, every ten or fifteen minutes, may be useful to maintain uterine contractions.

Should these *secondary hemorrhages* be maintained by coagula of blood, or portions of the placenta or membranes remaining in utero, they must be removed, if practicable, by the finger; for it is seldom possible that the hand can be employed. Ergot will also be useful, and, if there be any evidences of putrefaction, tepid injections of water may be thrown into the uterus.

Should these secondary hemorrhages arise from lacerations of the perineum or os uteri, and be profuse, astringent washes, or applications of lint, imbued with solutions of alum, per-sulphate of iron, etc., may be useful. The tampon has also been employed, and, no doubt, would be advantageous; but it should very seldom be resorted to, for fear blood might collect in the uterus.

If the hemorrhage arise from polypi, ulcers, fungous or cancerous excrescences, appropriate measures should be adopted to remove the cause, or palliate their bad influences. If congestion be kept up by displacements of the uterus, irritations from the bladder, rectum, or other organs of the body, all such sources of excitement should be sedulously obviated, and much attention be paid to regulate the nervous and vascular systems.

INVERSION OF THE UTERUS.—By inversion is to be understood the depression of the fundus into the cavity of the uterus, which may continue to increase until not only the fundus, but the whole body and cervix have passed through the os uteri; the organ is thus turned "inside outward." The mucous surface of the cavity now becomes external, and the peritoneal surface becomes internal; the pouch, thus formed, is lined by the peritoneum, and its orifice looks upward into the cavity of the abdomen.

This accident is, fortunately, very rare. It is reported, that among the Dublin and London Hospitals, not one case had occurred in one hundred and forty thousand deliveries. This has been attributed to the fact that the labors, in these institutions, were under the supervision of instructed practitioners; and it has been inferred that inversion of the uterus resulted, chiefly, where women were delivered without assistance, or where they were attended by ignorant midwives.

Causes.—The causes of inversion of the uterus are predisposing or exciting.

The predisposing cause is almost exclusively *inertia* of the uterus, existing after the birth of the child. When the uterus is soft and relaxed, it is very evident that any force, applied to the fundus, may readily precipitate it downward, through the os uteri, so as to appear in the vagina, or even externally through the vulva. If there be no such relaxation, such a precipitation would seem to be impossible. It is not necessary, however, that this relaxation should be universal; for there is reason to believe, as Drs. Radford, Dewees, and others suppose, that there are irregular contractions of the fundus of the uterus preceding inversion; but, in these cases, there must be great relaxation of the lower

part of the uterus, and of the cervix, to allow of the precipitation of the fundus. In other instances, there is relaxation of the fundus, yet contraction and even rigidity of the cervix, permitting, therefore, a depression of the fundus into the cavity of the organ, but preventing its passage through the os uteri.

In a few cases, this predisposing cause may be entirely absent. The presence of a polypus, or of hydatids, in the organ, may—in a restricted sense—be considered as predisposing. Considering the dense character of the uterine tissue, the small size of the cavity of the organ, and the few cases reported of inversion in the unimpregnated condition, or during the first months of utero-gestation, it can hardly be credited, without supposing some peculiar deformity or morbid condition of the uterus.

The exciting causes may be various. Observation shows that by far the most frequent cause is *traction upon the umbilical cord* after delivery. Thus, Dr. C. A. Lee, of Peekskill, New York, in a valuable article published in the American Journal of the Medical Sciences, for October, 1860, states, that out of sixty-two cases, the accident resulted from traction on the cord in thirty-nine. Under this head must be included those cases which have occurred in consequence of rapid labors, especially where women were delivered in a sitting or standing position; the weight of the child suddenly drawing down the fundus of the uterus, when the placenta was still adherent, and the uterus relaxed.

Artificial attempts to extract the placenta, independently of traction, have also caused inversion, in the proportion of seven cases out of sixty-two. The more complete, therefore, the inertia, and the more closely adherent the placenta, the greater the liability to inversion from injudicious efforts to extract this body.

The *bearing-down efforts* of the mother have often produced a depression, and even complete inversion of the womb. The uterus, therefore, is sometimes inverted almost immediately after the delivery of the child; its tissues becoming suddenly relaxed, and the patient persevering in her efforts to deliver the placenta. There is reason to believe that the mere distension of the abdominal cavity by gas, water, etc., may be sufficient to produce inversion, where the relaxation is great, even when there has been no contraction of the abdominal muscles; indeed, cases are said to have occurred, post-mortem, which can only be explained in the above manner. These facts will probably explain why this accident will occasionally occur, even under the superintendence of prudent and educated accoucheurs.

The mere *weight of the placenta*, when this body is

attached to the fundus uteri, has also been regarded as an adequate cause.

A *short cord*, or, what practically amounts to the same thing, a cord frequently entwined around the neck or body of the child, has been considered as an exciting cause. Its influence is doubtful, inasmuch as the contractions of the uterus and the bearing-down efforts keep the fundus at the same relative distance from the umbilicus of the child, until its body is delivered. A short cord can only be injurious, if, after delivery, the uterus suddenly relaxes, and the body of the child is incautiously removed too far from the mother.

Dr. Radford regards *irregular contractions of the uterus* as an exciting cause; many would allude to a kind of inverted peristaltic action of the circular fibres, the contractions of the cervix commencing first, and causing a descent of that portion of the organ, to be followed in succession by that of the body and fundus. We can perceive no good reason for either of these suppositions. Contractions of the fundus, as before mentioned, may exist, and, when inertia of the lower portion of the uterus is also present, may predispose to, or even hasten the process of inversion, under the influence of other exciting causes.

Polypi have also caused inversion of the uterus. Dr. Crosse, of Norwich, England, reports that out of four hundred cases, forty resulted from the presence of polypi. Under the influence of this cause, the process of inversion is usually slow; for as a polypus, with a comparatively short neck, is gradually developed, the orifice of the uterus becomes dilated, allowing the descent of the polypus, dragging with it the fundus of the uterus. In other instances, it may occur more rapidly, when severe contractions of the uterus, especially under the influence of ergot, suddenly expel the polypus from its cavity; or when the surgeon has, by forceps or hooks, dragged the polypus from the uterus into the vagina.

Dr. Thatcher has reported a case of *hydatids* as a cause of inversion; but this can only exist as a predisposing cause, by gently distending the uterus, and thus, after its expulsion, leaving the organ in a state of inertia.

Degrees of Inversion.—There are at least three degrees or stages of inversion of the uterus. In the *first* there is a depression of the fundus, or a portion of the sides of the uterus, so that a convex swelling may be detected in the interior of the organ, but still within the os uteri, diminishing the size, and especially the depth of the cavity; while, externally, there is a concavity often to be felt through the parietes of the abdomen.

In the *second*, a portion of the uterus has passed through the circle of the os uteri into the vagina, where it presents an ovoid tumor; and the orifice of the uterus can be detected, surrounding the protruded part. The depth of the uterus is now greatly diminished in proportion to the extent of the inversion, the cul-de-sac, or pocket, alone representing the original cavity of the organ. This has been termed "introversion," or partial inversion of the uterus.

In the *third* degree, the inversion is complete; the whole organ has passed the verge of the os uteri, into the vagina, and often through the vulva externally. The original cavity of the uterus has entirely disappeared; the edges of the os uteri can seldom be detected while the orifice of the uterus is now open toward the abdomen, representing a new cavity, lined with the peritoneum. In this peritoneal cavity will be found portions of the Fallopian tubes, of the round and broad ligaments, and, occasionally, it is said, the ovaries, and even portions of the omentum and small intestines.

Symptoms.—Prior to the occurrence of the accident the woman is usually in good condition; if the inversion occurs speedily after the birth of the infant there are no premonitory symptoms. If, however, there is delay, the ordinary indications of inertia, especially a hemorrhagic tendency, are occasionally manifested. As soon as the accident has occurred great distress is experienced, which is often accompanied with severe and almost continuous pain; the patient becomes agitated, depressed, and is disturbed, in many instances, by spasmodic affections, and occasionally even by convulsions. There is, very universally, great depression of the whole system, and sometimes a complete collapse, and death. The woman seems to perish from the "shock," as hemorrhage is not always present. Should there be much hemorrhage, this, of course, enhances the danger.

Locally, the accident is indicated by a great diminution, or the entire disappearance of the uterine tumor in the hypogastric region. If the tumor be still felt, it will be found no longer spherical, but irregular in its form, and the cup-like depression of the fundus can frequently be recognized through the relaxed walls of the abdomen. An examination per vaginam will, in cases of simple depression, find the os uteri more or less contracted; but a finger, being passed into the uterus, recognizes the depressed fundus, resembling a tumor, occupying the cavity of the organ. If a bougie or uterine probe be introduced to one side or the other, the depth of the uterus will be found greatly diminished.

If it be an example of introversion, an ovoid tumor

will be found in the vagina, sometimes partially covered with the placenta; or, if that be removed, the comparatively rough surface of the mucous membrane of the uterus will be recognized. The edges of the os uteri will be readily detected, and a finger or probe can be passed some distance within, indicating the depth of that portion of the uterus which had not been inverted.

If a complete inversion exists, the hypogastric uterine tumor has entirely disappeared, while a large tumor will be found occupying the vagina, and, not unfrequently, protruding externally, beyond the pudendum. The edges of the os uteri can no longer be felt, having been completely everted.

In all these varieties, there is much pelvic distress, and sensations of fulness and weight, exciting a disposition to bear down; there is pressure upon the rectum, also upon the bladder and urethra, and hence, tenesmus, dysuria, and, sometimes, complete retention of the urine. There is usually hemorrhage, the degree of which varies exceedingly. In cases of depression, where the placenta remains attached, the flow of blood is trifling, but becomes greater if the placenta has been separated. If it be a case of introversion, the pain and hemorrhage is usually much greater, owing to the contraction of the os uteri around the body of the uterus, producing partial strangulation, and passive congestion of the uterus. If the placenta be detached, the hemorrhage, under these circumstances, is often very profuse and dangerous. If the inversion be complete, the hemorrhage is not so great, as the uterine circulation is not interrupted, and as the contraction of the muscular tissue occurs, to a greater or less degree. The pain, also, for a similar reason, is much less. Should inertia be present, hemorrhage will, even in these cases, be profuse.

Prognosis.—Inversion of the uterus, from the severe "shock," and the profuseness of the hemorrhage, is often rapidly fatal. Mr. Newnham says that, in a great number of instances, there is "immediate dissolution." Many individuals, however, survive for days, weeks, and sometimes for many years. Mr. Crosse, of Norwich, England, states, that out of one hundred and nine fatal cases, seventy-two women perished within a few hours, eight within a week, six within four weeks, one at the fifth month, one at eight months, three at nine months, and the balance, eighteen in number, at periods from one to twenty years.

In cases of depression of the fundus, the danger is not very great; for, as the inertia of the uterus disappears, the contraction of the circular fibres of the cervix and lower portion of the body of the uterus must tend, not only to diminish the size of the organ, but gradually to

restore the fundus. Such contractions also diminish, and eventually arrest the hemorrhage.

Where introversion of the uterus exists, the danger is most imminent; for, if not immediately fatal, the contraction of the os uteri will interrupt the uterine circulation, so that the patient will have almost a continuous bleeding, and, at the menstrual epochs, severe hemorrhages will be continually recurring. These floodings will alternate with serous, mucous, and other leucorrhœal discharges, so that the strength of the patient, after weeks or months of distress and pain, will be completely exhausted. This exhausting process is often aggravated by the occurrence of metritis, producing profuse purulent discharges, and ulcerations, and even mortification of the uterus.

In complete inversions the danger is less. In such cases, the uterus gradually contracts, and even if it were originally a large mass protruding through the vulva, it will generally be reduced to the size of the unimpregnated organ, and the whole retracted into the vagina. During this process of retraction, it is possible that any portion of the intestine, which may have descended into the peritoneal pouch, might be strictured by the os uteri, and thus greatly aggravate the sufferings and dangers of the patient. In these cases, the woman, for many months, is liable to hemorrhagic discharge; her menses are profuse, and often leucorrhœa exists. If, however, the patient's constitution be good, all these symptoms become more moderate, the leucorrhœa may disappear, and there may be little or no hemorrhage. The patient often recovers her health and strength, and may become quite corpulent. Several cases, indeed, are recorded, where the accident had occurred, but was never suspected, its existence being eventually revealed by an examination, when death had occurred from other diseases. Madame Boivin met with such an example, which had lasted five years, and Dr. Lee, of Peekskill, New York, a similar one of twenty-five years' duration.

In these chronic cases of inversion, some symptoms of displaced uterus usually remain, such as frequent inclination to urinate, pressure upon the rectum and perineum, and sometimes a sense of protrusion at the vulva, with more or less weakness of the back, and indisposition to exercise.

During the reduction of the size of the uterus, its peritoneal cavity is proportionally diminished, so that the opposing surfaces are brought into contact; and, in some cases of long duration, they have adhered to each other, thus destroying the peritoneal sac, and excluding the uterus from the general cavity of the peritoneum.

Such is the usual history of inversion of the uterus.

The patient often perishes immediately, or by the slower process of exhaustion from hemorrhage, inflammation, or mortification. In other instances, she survives, and may enjoy a good degree of health for many years.

Spontaneous Restoration.—Notwithstanding the general truth of the above observations, yet there are a few cases upon record, where the recovery of the patient has been complete, the inversion of the uterus has gradually, or perhaps suddenly disappeared, and the organ has resumed its natural form, so that the woman has even again become a mother. This unexpected, and perhaps inexplicable result, is substantiated by several cases, which seem to be undeniable. Thus, M. Cazeaux informs us that M. Delabarre met with a case of long standing, in which the spontaneous reduction of the womb took place. Baudelocque, also, records an instance of a lady, who was delivered of her first child at Cape François, in 1782, when inversion of the uterus occurred, which nearly proved fatal. Some eight years afterward, she fell under the care of M. Baudelocque, in Paris, who was satisfied that it was a case of inverted uterus, and made unsuccessful efforts to reduce it. Soon afterward she fell, while attempting to walk across the room; she complained of peculiar sensations in the lower part of the abdomen, which were followed by fainting. M. Baudelocque, on examination, found that the tumor had disappeared. She recovered her health, became pregnant, and was safely delivered at term. M. Daillies, in his thesis, alludes to some other instances.

One of the most positive cases, however, of reduction occurred in this city, and has been recorded by Dr. Meigs, in his translation of Colombat on the Diseases of Women, and also in his work on Obstetrics. The inversion had existed for two years before Dr. Meigs was requested to visit her by her then attending physician, Dr. Moehring. These gentlemen were satisfied that the uterus was inverted, after a careful attention to the history of the case, and an accurate examination per vaginam. This woman was subsequently seen by several physicians, including the late Dr. George McClellan, and also Dr. Warrington. This latter gentleman requested the author to investigate the case, about two years after it was first seen by Dr. Meigs. The woman, who was the wife of a baker, now enjoyed excellent health, and was able to attend to all her usual avocations. The author was satisfied of the correctness of the diagnosis, as reported by all her medical attendants. About a year after his visit, Dr. Warrington exhibited to the author a fœtus of nearly five months, of which this woman was delivered a few hours previously, under his superintend-

ence. She subsequently bore other children at term, and enjoyed excellent health. That this was originally a case of inverted uterus, there can be no reasonable doubt; it cannot be supposed that so many experienced gentlemen had mistaken a polypus for an inverted uterus. The characteristic indications of polypoid tumors were absent, and there was no reason to believe that any tumor had ever escaped from the vagina, and certainly none had been removed by an operation.

Dr. Meigs has recorded a second case, of a lady aged twenty-seven years, residing in this city, who was delivered very suddenly of a child before her physician, Dr. Levis, reached her apartment. She flooded profusely, but upon examination Dr. Levis was satisfied that the uterus had contracted normally, and could be felt in the hypogastric region. She continued to do well for two weeks, when she again had a profuse hemorrhage. This continuing to recur at intervals, Dr. Levis again examined her per vaginam, and found a tumor which he regarded as an inverted uterus. Five weeks after her delivery Dr. Meigs made a careful examination, and came to the same conclusion. The uterus could not be replaced. A palliative treatment was recommended, and some time after she took a long journey to the West. She recovered her health and again became pregnant, and was delivered of a healthy child by Dr. Levis.

A third case has been communicated to Dr. Meigs, in a letter from Dr. Johnson C. Hatch, of Kent, Connecticut. He states that a lady was delivered of her first child on the 22d day of August, 1845; the labor was easy and natural, and the placenta came away without any assistance; there was a moderate hemorrhage, which excited no alarm. At the expiration of fifteen hours she was again seized with severe pain, which continued for two or three hours, and then suddenly ceased. Dr. Beardsley was sent for on the emergency, and found the patient much exhausted. Her system reacted under stimuli, when an examination was made per vaginam, and Dr. B. recognized an inverted uterus, one-third larger than the egg of a goose, protruding from the vulva. Dr. Hatch confirmed the diagnosis, and unsuccessful attempts to reduce it were then made. Professor Beers, of the Medical Institution of Yale College, was sent for, and after examination declared that it was no doubt a case of complete inversion of the uterus. This was also the opinion of Dr. St. John, of New Melford. An attempt, protracted for three or four hours, was made by Professor Beers to effect reduction, but ineffectually. Palliative treatment was now adopted; and the patient so far recovered as to be able to ride out. She remained, however, conscious of

the presence of the tumor, and suffered, for nine or ten months, a sensation of weight and dragging. At the expiration of this period these sensations disappeared, and she was no longer aware of the existence of a tumor. Her health now improved, and in February, 1847, she menstruated regularly, although freely. In December, 1847, pregnancy was suspected, and in May, 1848, she was safely delivered of a full-grown fetus.

The question as to the mode in which spontaneous restoration is accomplished is interesting. It may possibly be effected by the gradual contractions of the longitudinal fibres, especially if there should be any relaxation of the circular fibres of the os uteri; but the suggestion of M. Daillies is very plausible, that the restoration arises from the contraction of the muscular fibres of the Fallopian tubes, and those of the broad and round ligaments of the uterus.

These facts seem to prove that the spontaneous restoration of the uterus, after inversion, is possible, and may therefore be presented as a source of comfort and hope to those unfortunate women in whom reduction, by artificial measures, have entirely failed.

Diagnosis.—In cases of acute or chronic inversion of the womb the diagnosis is generally very easy to the instructed and prudent accoucheur. Nevertheless, the most horrible accounts are given of ignorant midwives and of rude and bold practitioners, who have mistaken a recent inversion for a placental mass, polypoid tumor, or prolapsus uteri, and where powerful traction has been made, so as to pull away the whole organ, with its appendages, and sometimes with portions of the abdominal viscera.

Dr. Meigs mentions a case of recent inversion, to which he was called, where the practitioner had immediately thrown a ligature around the neck of the tumor, supposing it to be a polypus. The ligature was removed, and Dr. M. succeeded in effecting the restoration of the uterus.

In other cases, the breech, or even the head of a second child, have been mistaken for an inverted uterus.

The most ordinary sagacity and common prudence would have avoided such mistakes. As the placenta, however, is sometimes adherent to the protruded fundus, the practitioner should be careful not to attempt its removal, under the idea that the placenta alone has entered the vagina; but to ascertain carefully whether the womb has not also descended.

An inverted uterus may be mistaken for polypus, especially if this last had been intra-uterine during pregnancy, and had only appeared after delivery. Polypus is to be distinguished by the greater smoothness of the surface, usually by a greater length of its pedicle, but especially by the fact that the uterine tumor can still

be felt, of its proper form, over the pubis; and also, that a probe or bougie can be readily introduced to the ordinary depth of the uterus after delivery.

In *chronic inversion*, the diagnosis between it and polypus is usually much more difficult, as the uterine tumor in the hypogastric region is absent in both cases, and as the surface of the inverted uterus often loses its rough character, and becomes more smooth, resembling a polypus, and its sensibility is sometimes very trifling. We read of cases where the uterus has been removed upon the supposition that it was a polypus; and also, the reverse, where a polypus has been operated upon under the idea that it was inversion of the womb. Nevertheless, the points of difference are very distinct. In cases of inversion, if a finger be passed into the rectum and a "sound" into the bladder, the extremity of this sound will be felt beyond the tumor by the finger in the rectum, showing that there is no body above the cul-de-sac of the vagina; while, in cases of polypus, the uterus would intervene between the sound and the finger. Dr. Meigs varied this mode of examination by placing one or two fingers in the posterior cul-de-sac of the vagina, and the fingers of the other hand over the hypogastric region, and succeeded in bringing them so nearly into contact, as to satisfy him that the uterus did not exist in its proper position. If the walls of the abdomen be sufficiently thin, this mode may answer; but, in cases of obesity, no positive opinion could be thus formed.

Dr. Simpson has insisted that, in such cases, the sound, introduced into the uterus, is very valuable; for, if a polypus exists, the uterine cavity will be found in its normal state and of its proper length; if there be inversion, the cavity of the uterus will be diminished, or even destroyed, in proportion to the degree or completeness of the inversion. He states that there may be some difficulty where inversion is complicated with polypus; but, in these cases, the polypus generally adheres to the uterus by a narrow neck. Hence, the lower ovoid portion formed by the polypus could be distinguished from the superior tumor constituting the uterus. Moreover, the polypous tumor would be insensible, and the uterine swellings would be sensitive. Should, however, the polypus adhere by a broad surface, the difficulty might be great in distinguishing between the one tumor and the other, demanding great care in deciding upon the proper mode of relief.

There is another case of difficulty which may possibly occur. The author was consulted by a lady who had, for some two or three years, symptoms of displaced uterus, with leucorrhœal and hemorrhagic discharges. Upon examination per vaginam, a smooth tumor, about an inch and a half in length, could be

felt, but the os uteri was hardly to be recognized; a thin edge could alone be detected on one-third of the circumference, conveying the idea of a complete chronic inversion where the lips of the os uteri had been almost entirely everted. This was rendered more probable, as a probe could not be passed into any opening or orifice. On a subsequent examination, however, the uterine sound, by a firm pressure on one side of the tumor, was passed into the uterus, which proved to be of the ordinary depth; hence, it appeared that the vaginal swelling was of a polypoid character. It was removed by ligature, and the patient did well. If a polypus was adherent to the whole margin of the os uteri, completely closing the orifice, the diagnosis could only be satisfactorily determined by the examination formerly mentioned, by passing a sound into the bladder and a finger into the rectum.

Treatment.—The great danger of this accident, and the fact that very little is to be anticipated from any spontaneous efforts for the relief of the patient, throws great responsibility upon the medical attendant. Everything depends upon his promptness, skill, and decision. The treatment differs in acute and chronic cases.

In *acute* cases, if, upon examination, the fundus of the uterus be found to be merely depressed, the practitioner should immediately pass the hand into the vagina, and introduce one or more fingers, and if the os be dilatable the whole hand, into the cavity of the uterus, so as to push up the depressed fundus, and maintain it, *in situ*, until the uterine tissue is everywhere regularly contracted. Should the os uteri be contracted, a small conical wooden or metallic bougie, with its base or superior extremity smooth and rounded, may be substituted for the finger. This can be more readily pressed into the uterus, and by it the fundus may be elevated and retained until contractions be established. It has also been suggested to pass a flaccid gum-elastic bag, into which a canula has been introduced, into the cavity of the uterus, then by distending the bag, a very regular and uniform compression may be made, well calculated to raise the depressed fundus, and, at the same time, to stimulate the uterus to contraction. No traction effort, of course, should be made upon the umbilical cord, and no attempts to remove the placenta, until it is completely detached, or even expelled by the uterine contractions. A longer time than usual should be allowed for the expulsion of the placenta. Should it, unfortunately, be found preternaturally adherent, it may be artificially separated and removed after there is a sufficient condensation of the uterine tissue.

If it be a case of introversion, or of complete inversion, an immediate attempt should be made to replace

it, before the whole body of the uterus, and especially the os uteri, is so contracted as to render the operation difficult, if not impossible. It has been questioned whether the placenta, if still attached, should be previously removed; authors are divided upon this point. Many say that, if it be removed, there will be dangerous hemorrhage; or that uterine contractions will so rapidly ensue on its removal, as to impede or prevent the success of the operation; and also that important time will be lost. On the other hand, it is maintained that the presence of the placenta will, from its size, greatly increase the difficulty of the process of restoration. This difficulty, we conceive, is of no great practical importance. It is best not to touch the placenta, but immediately to attempt to reduce the body of the uterus with the placenta, under the hope that the os uteri will be sufficiently relaxed to allow the whole mass to be restored. If this should not be possible, then the placenta should be carefully detached, and the attempt at reduction be again made.

The mode of operating, as generally directed, is to grasp the whole body of the uterus by the hand, and then to direct the point of one or more fingers upon the fundus to determine it directly upward through the os uteri, to be followed by the body, and subsequently by the cervix. Dr. Meigs very justly objects to all such compression of the uterus, as calculated to promote its contraction and condensation, and thus to render the ascent of the fundus more difficult. He advises, therefore, pressure to be made on the fundus by one or more fingers, and to watch for moments of relaxation of the tissues for operating, and then to direct it steadily upward, in order to effect reduction. Sometimes a bougie of a conical form, with a round and smooth base, about half an inch or an inch in diameter, may be substituted for the fingers. As restoration is nearly accomplished, the organ recedes suddenly, with a kind of jerk, but, nevertheless, the bougie or the fingers of the practitioner should be carried into the uterus, and be there retained until decided tonic contractions are established.

Should the contractions of the os uteri or the body of the uterus be great, a large dose of opium might be previously administered; or, what is more promising, the patient should be etherized, which would facilitate the operation by promoting relaxation, especially of the os uteri, and by destroying the sensibilities and restlessness of the patient.

The results of this operation for restoration are very favorable. It appears that out of fifty-two cases, reported by Dr. Lee, where reposition of the uterus was accomplished, thirty-seven were restored within twenty-four hours after the accident, and of these

only five died. It does not appear, however, in how many cases immediate restoration was attempted, or, when undertaken, how often it succeeded. As already stated, the majority of persons perish from inverted uterus; many, doubtless, from neglect, and many, also, from ignorant or unskilful management. There is reason to believe, that if the operation be early undertaken, and skilfully performed, that restoration can very generally be effected; perhaps more frequently in cases of partial inversion, or introversion, than when inversion is complete.

Should, however, the practitioner fail in the restoration of an introverted uterus, Dr. Dewees would advise traction upon the fundus, so as to effect a complete inversion. His object is to deliver the organ from the effects of strangulation from the os uteri, which augments the hemorrhage, and the danger of inflammation and gangrene. It is possible that, in some extreme cases, this plan may be justifiable; but certainly it ought not to be adopted, until all the usual means have failed, after repeated trials, while the patient is in a state of anæsthesia; nor even then, unless the leucorrhœa, hemorrhage, etc., are of very serious import. Experience now proves that a spontaneous or artificial restoration may be anticipated, even after the lapse of years; and these will more readily ensue in cases of partial than of complete inversion.

All attempts at reduction failing, palliative treatment becomes very important. Pain, restlessness, and other nervous symptoms are to be obviated by antispasmodics and narcotics; while the strength of the patient is to be supported by nutritious diet, tonics, and even by stimulants.

The disposition to leucorrhœa and hemorrhage is to be counteracted by perfect rest—even avoiding all disposition to strain—by cool or cold injections into the vagina, and by the free use of astringent washes. All indications of inflammation of the uterus, peritoneum, and intestines must be moderated by the usual remedies. Although many perish from the chronic irritations and discharges resulting from this accident, yet, as we have seen, by care and attention, many will survive a long time, often regaining health and strength, death eventually occurring from other diseases.

In *chronic* cases, such favorable results are not usually to be anticipated; the patient may be gradually exhausted by the local irritations and discharges. To obviate these unfortunate results, two measures are at the command of the accoucheur: the first, is to attempt the restoration of the uterus, and the second, to remove the organ.

Until of late years, the *artificial restoration* was thought to be impracticable; but there are numerous

instances, now upon record, in which the operation has been perfectly successful. Of the fifty-two cases of restoration, already mentioned, as collected by Dr. Lee, fifteen had existed longer than twenty-four hours. In these fifteen cases, reduction was effected in seven, within three weeks after delivery, the patients recovering. Of the remainder, in one the uterus was restored at three months, a second at four months, three at six months, one at seven years, another at twelve years, and the last at fifteen years. Two proved fatal: one woman, where the restoration was effected at the sixth month, died of exhaustion on the third day; and in the other, where the operation was performed at the expiration of fifteen years, by Professor J. P. White, of Buffalo, New York, in January, 1856, the patient perished on the sixteenth day from peritonitis.

Judging from this statement, it would seem that the proportion of deaths, when the operation was performed within the first twenty-four hours, was very nearly the same as when delayed to a longer period; being in the former 13.51 per cent., and in the latter 13.33 per cent. The success of artificial restoration, in cases of inverted uterus, has been sufficiently great to justify prudent attempts in most cases of this unfortunate accident, especially where the patient's health is impaired. If a woman be in good health after menstruation has disappeared, the operation cannot be recommended; but in earlier life, especially in married women, it may be proper, even if her general health should be good.

Too much, however, must not be anticipated; as, in many instances, restoration will be impossible, owing, not merely to long-continued and complete contraction of the orifice and body of the organ, but from the fact that the peritoneal cavity is, sometimes obliterated by adhesions of its opposing surfaces.

The mode of operating is similar to that already directed. The patient should be placed in a state of complete anæsthesia, that she may escape all suffering, and that relaxation of the uterine tissues should be secured as far as practicable. It is usually recommended to grasp the body of the uterus with the hand introduced into the vagina, so as gradually to compress the organ and reduce its size. Firm pressure should then be steadily made by the thumb on the fundus of the uterus, so as to indent it, and gradually to cause its ascent toward the orifice of the uterus. If this should yield, the fundus and body will be reverted, and the uterus be restored to its original condition. Much time and patience is now demanded, and the pressure upon the fundus may be maintained not merely with the thumb, but with the fingers or with the conical bougie already mentioned.

Dr. Tyler Smith has ingeniously suggested a modification of the mode of making pressure. In a case of twelve years' duration, where the neck of the uterus was very much contracted, and the patient very anæmic, he distended the whole vagina, and pressed the fundus and body of the uterus upward by a gum-elastic bag filled with air, and every morning and evening, after removing the bag, he grasped and moulded the uterus for about ten minutes at a time. By these measures, he expected to dilate the os uteri, so as to allow the return of the uterus. This was happily accomplished on the eighth day: the patient perfectly recovered, and afterward became pregnant. This method has succeeded in the hands of other individuals. Dr. West operated successfully in a case of nearly twelve months' duration, and Dr. Bockendahl in another of six years'.

Where a *Polypus* complicates the inversion, it would be best, as a general rule, to remove the polypus prior to any attempt at restoration. If the knife be employed, the attempt at restoration might be immediately made; but if the removal is effected by ligature, some time should elapse, until all irritation of the uterine tissue, excited by the operation, has entirely subsided. Great care also is requisite, in some cases, not to include any portion of the uterus when operating upon a polypus. This, as we have already mentioned, is sometimes difficult. Dr. Simpson would advise, in doubtful cases, the division and enucleation of a polypous tumor.

After the restoration has been established, the patient should be kept at rest, and subjected to a careful regimen, so as to prevent or obviate any disposition to inflammatory action; for the cases, already alluded to, prove that death may result even after the restoration.

The second mode by which relief may be sometimes afforded is by the *Extirpation of the Uterus*.

The idea of removing the uterus, when in its ordinary position in the pelvis, could not be entertained by any practitioner; but, in chronic inversion, the case is very different. The womb is no longer located among the intestines, but in the vagina; a peritoneal cavity has been substituted for one lined by a mucous membrane. After some time, this peritoneal cavity becomes exceedingly small, by the contractions of the uterus, and, not unfrequently, may be entirely obliterated. In such cases, the organ may be considered as excluded from the cavity of the abdomen, and its removal may sometimes be effected without opening the sac of the peritoneum. Hence, although the sympathies of the uterus are still very great, and a severe shock may, therefore, be given to the general system, by any operation on its tissues, yet the liability to

peritonitis is greatly diminished. The danger also of hemorrhage is comparatively trifling, as the blood-vessels going to the uterus will be all included within the ligature of the operator.

Experience has shown that the operation may be performed with a reasonable prospect of success; as Dr. West, in his "Diseases of Women," informs us that, out of fifty cases, where the uterus was removed, thirty-six recovered. Of the remainder, twelve died, and in two, the operation was abandoned. This is very encouraging, especially as Dr. West and other good authorities would restrict the operation to "extreme cases," where it was evident that the constitution of the patient was sinking under suffering and constant discharges. As a dernier resort, therefore, extirpation is justifiable in cases of chronic inversion of the uterus. Observation has shown that, if through ignorance or rashness the womb has been removed soon after delivery, the result has been very universally fatal. It is only, therefore, in chronic cases, that the operation should be performed. The propriety of this restriction is confirmed by the facts already mentioned respecting the size and vascularity of the organ, and the contraction or, it may be, the obliteration of the peritoneal pouch.

The uterus has been removed by means of the ligature, the knife, and the *ecraseur*.

The *ligature* has been very universally employed. Its application is easy by means of the instruments used for removing polypi. The material for the ligature has been varied. Dr. West recommends silver wire and dentists' silk twisted together. Well-annealed iron wire has sometimes been preferred. The common silk ligature, or the sea-grass cord used by fishermen, answers exceedingly well. It has been recommended by some to strangle the tumor, at first imperfectly, and gradually to tighten it according to the symptoms excited. The ligature should, however, in all cases, be applied with sufficient firmness to interrupt the whole circulation; for, if the venous flow be alone arrested, the uterus will become congested, enlarged, and painful. If severe symptoms arise, the ligature may be loosened, or even removed. Dr. Ramsbotham records a case where the operation was performed on a uterus inverted for ten and a half months. At the expiration of twenty-four hours the ligature was removed, as the patient was seized with chill, pain, and other indications of peritonitis. The symptoms disappeared, the hemorrhage and leucorrhœa ceased, and at the end of six months, the patient enjoyed good health, and menstruation returned regularly.

It is generally advised, however, to tie the ligature at once firmly, and as the tissues yield, to tighten it

every day, until the uterus falls off. The shock to the system is generally great, sometimes inducing prostration. Reaction usually ensues, with symptoms of local inflammation, which are often not very severe, so that the patient recovers. In thirty-eight cases, as collected by Dr. West, twenty-eight women recovered, eight died, and in two the ligature was removed, the patients surviving.

The *knife* has been occasionally used with or without the ligature. No advantage, says Dr. West, has resulted from the excision of the uterus, where the ligature was also employed. Of four instances, where the knife alone was used, three recovered, and one died of peritonitis; while in eight cases, where both were employed, five recovered and three died.

The *ecraseur* has also been resorted to, but to what extent we are not informed. Dr. E. Wallace, Professor of Obstetrics in the Jefferson Medical College, operated, in June, 1863, with this instrument, where the uterus had been inverted for three years, and where the cervix was greatly contracted. After the vitality of the tissues of the uterus were completely destroyed, the chain was removed without separating the uterus from its attachments, a ligature having been previously thrown above the chain to prevent any hemorrhagic tendency. On the second day the patient was seized with chills, followed by pain, subsequent exhaustion, and death. On examination, there were evidences of peritonitis, and also of severe inflammation of each ovary, which were thickly covered with lymph. These organs were not, in any degree, involved in the operation.

The *dangers* arising, therefore, from extirpating the uterus, are primarily, from the severe "shock" given to the whole system, and, secondarily, from the occurrence of peritonitis. The former may, to some extent, be obviated by the employment of opium and anæsthetics; while it is possible that some modifications of the operation may diminish the liability to inflammation. As already intimated, the operation ought not to be early performed; it should be delayed until all symptoms of congestion are removed, and until there is evidence that the peritoneal pouch be greatly contracted, or even obliterated. The suggestion not to strangle, at once, all the tissues, may be of importance; as adhesions may speedily occur between the peritoneal surfaces of the cervix uteri above the ligature, and thus circumscribe the inflammation.

With the same object, the suggestion made by Dr. Physick of promoting the adhesion of opposing peritoneal surfaces, by means of a seton, in the case of a preternatural anus, might perhaps be imitated in this case. A strong curved needle, armed with a double ligature, might be passed directly through the cervix,

from one side to the other, and be allowed to remain for several days without being tightened. The puncture of the needle, and the presence of the ligature, would excite comparatively but little irritation. Adhesion would ensue in the peritoneal pouch of the uterus, and when all irritation has subsided, the ligatures should be tied, one anteriorly, and the other posteriorly, so as to strangulate the uterus.

Where a *polypus* coexists with an inverted uterus, both may be simultaneously extirpated by means of the ligature or knife. If the polypus be large, it may be excised previously to operating upon the uterus; or, in some instances, the removal of the polypus alone may be sufficient to arrest the leucorrhœal and hemorrhagic discharges, so that the patient may regain her health.

Irreducible inversions.—The weakness in these cases, produced by the evacuations, may be palliated by proper hygienic treatment, assisted by tonics, stimuli, etc.; while the discharges may be moderated by the use of cold astringents, etc.

To relieve the dragging sensations, an external T bandage will often be useful. Pessaries have been recommended, but the author's experience with them is not favorable: in several instances he found the symptoms of pressure and weight were augmented, so that the removal of the instrument was necessary. In all cases there is danger, in the use of the pessary, of exciting a local inflammation of the mucous membrane of the uterus, by the pressure of the instrument.

The suggestion, however, of Dr. Tyler Smith, to distend the vagina by a bag filled with air or water, and thus to make equable pressure upon the inverted organ, may prove advantageous, and may possibly facilitate any latent disposition to spontaneous restoration.

LABOR COMPLICATED WITH EXHAUSTION.—In very many instances, the delivery of the child cannot be accomplished in consequence of a want of power in the uterus, or in the general system. The uterine efforts become more and more inefficient, until they are completely suspended, so that the child and mother perish without artificial assistance. This constitutes labor with syncope or exhaustion, the "powerless labor" of the British accoucheurs. It is to be distinguished from inertia, or deficient excitement, by the fact, that although there is a want of action in both cases, yet where there is a loss of power, stimuli have either no influence over the uterine functions, or such influences are transient and ineffectual.

Powerless labor often depends upon the general system. Where the patient has been greatly weakened by profuse hemorrhage, excessive diarrhœa, or by the long

continuance of difficult or impracticable labor, her strength is exhausted, she becomes incapable of further exertion, and her vital forces soon entirely fail.

There are many cases of general debility depending upon the natural temperament or constitution, upon the influences of acute or chronic diseases, which so undermine the strength of the patient, that she becomes incapable of the necessary exertions requisite for delivery. In such instances, however, delivery often readily ensues, as there may be great relaxation of the os uteri and perineum, affording trifling resistance, while the bearing-down efforts, although not strong, are still operative. Thus, as already mentioned, labors in consumptive patients, or during the exhaustion resulting from acute attacks of disease, are often rapid.

The uterine powers are seldom originally deficient; but they are exhausted by protracted or violent efforts to accomplish delivery. Such exhaustion, therefore, is generally the result of protracted labors, arising from mal-presentations or deformities of the infant, rigidities of the tissues, deformed pelves, the presence of tumors, preternatural constrictions of the os uteri or vagina, or any other cause of difficult or impracticable labor. In such cases, the powers of the uterus become gradually more and more weak, until all action is suspended.

Powerless labor, therefore, is very seldom primitive; it is almost always secondary, and rather a symptom of difficult or impracticable labor.

The *symptoms* of labor with exhaustion are very evident. The gradual failure of uterine action, which cannot be re-excited, the sensations of weakness and exhaustion of which the patient complains, the oppression of the breathing, palpitation of the heart, the nausea and vomiting, which is often great, and accompanied usually with tympanites, pallor and coldness of the surface, followed by cold and clammy sweats, sunken countenance, failure of the pulse, jactitation, and muttering delirium, too evidently indicate the approach of complete collapse and death. These symptoms are often accompanied, in protracted cases, by evidences of inflammation in the pelvis or abdomen, and are occasionally preceded by some febrile symptoms of a nervous or typhoid character. The skin is hot and dry, the pulse irritable and very frequent, often beating one hundred and forty or one hundred and sixty times in a minute; the mouth is dry, the tongue and teeth covered with a dark dry matter; the features are contracted, and there is delirium, with great oppression at the chest, and other nervous symptoms, succeeded by coma and complete prostration.

Should relief, however, be afforded by the removal of the child, reaction may sometimes ensue; the surface of the body becomes warm, the pulse more full and slower, while the restlessness, delirium, and other nervous symptoms, gradually abate. Convalescence, however, is generally tedious, even under the most favorable circumstances. Unfortunately, inflammations of the vagina, of the cervix or body of the uterus, of the peritonæum, etc., may ensue, retarding the convalescence, and sometimes causing a fatal result. In other instances, especially after the loss of much blood, the reaction becomes violent, the pulse small, very frequent and irritable, the skin hot, the mouth dry, with more or less sordes upon the teeth, tongue, etc., and occasionally there are disorders of the stomach, liver, bowels, etc., or the development of pain, soreness, and various nervous and hysterical affections. Dr. Marshall Hall believes that this state of things is often the result simply of reaction after general exhaustion; but there is reason to believe, that, in most cases, there is some local irritation to excite and maintain this febrile condition. Nevertheless, as Dr. Hall observes, it should not be confounded with the sthenic forms of disease, for with all these manifestations of excitement, there is still great debility or loss of vital power. In all such cases, therefore, the prognosis must be exceedingly doubtful.

Where the woman survives after labor complicated with exhaustion, she generally does well; but sometimes chronic inflammations result, which may protract her convalescence, or may permanently injure her health. Occasionally, especially after great loss of blood, the patient remains weak, pallid, and enervated, even for many years, suffering from dyspepsia and hysterical affections, which may be followed by chronic diarrhœa, dropsical effusions, and other evidences of cachexia. In some cases, as Dr. Ramsbotham observes, latent morbid predispositions are developed, which, not unfrequently, hasten a fatal termination.

Syncope.—Connected with the subject of exhaustion is the occurrence of syncope or fainting during labor, or soon after delivery.

In a very large majority of such cases, syncope is a mere symptom of loss of blood, or of exhaustion. There are, however, instances, especially in women of an excitable temperament, where this accident is purely of a nervous character. As formerly mentioned, it may occur during pregnancy, occasionally during the first stage of labor, and less frequently during the second stage, where any predisposition of the kind is counteracted by the continual recurrence of pain. During the third stage, faintness is more frequently the consequence of the loss of blood, or of

exhaustion: nevertheless, it is sometimes nervous, as was mentioned when treating of post-partum hemorrhage of a moderate character; in which cases syncope is often disposed to return, even for hours, after the cessation of the bleeding, but there is very little, if any permanent debility, as the patient's system soon reacts, and she feels as strong and comfortable as usual. All such examples of syncope are hysterical, and seldom fraught with danger.

It, however, occasionally happens, that syncope is far more serious, and not unfrequently followed by collapse and death, where there has been no hemorrhage, no rupture of the vagina or uterus, and no exhaustion from protracted labor, and where even examinations after death afford no explanation of the untoward event. Various suppositions have been made to account for such sudden deaths, which are, however, not peculiar to the parturient state, but which occur to men as well as to women.

Powerful mental impressions have been thought sufficient to account for sudden fainting and collapse. Some women sink into a nervous, anxious, melancholic condition during pregnancy; and are firmly persuaded that they cannot survive the labor. In some few cases of this kind, death has actually occurred, sometimes before, but generally immediately after delivery, where no other cause can be assigned.

Change of position has appeared to be the proximate cause, as, in several instances, where the patients have seemed to be quite well, death has instantaneously occurred, after an evacuation from the bowels, or from assuming a sitting posture, or even, it is reported, from turning in bed.

A "*shock*" to the nervous system, in cases where there has been no difficulty in the delivery, and where there is no apparent exhaustion, is also assigned as a cause. Some have attributed the event to "*idiopathic asphyxia*," or to a sudden "*paralysis of the heart*;" in the latter case, death occurs instantaneously, while, in the former, the patient survives for some time, and may even recover.

It has been supposed that *air*, which no doubt occasionally penetrates into the vagina and uterus after delivery, may also enter the orifices of the venous sinuses, and thus into the general circulation; it is said even to have been recognized in the heart, as ascertained by a "churning noise" on auscultation. There can be little doubt, from numerous examples, especially in surgery, that sudden death may arise from the presence of air in the blood; but it may be doubted whether it can possibly find admission through the uterine sinuses.

Dr. Meigs, and others, have believed that a *coagu-*

lum of blood, suddenly formed in the heart, and, therefore, termed a "*heart-clot*," is the real cause of these accidents. We apprehend, however, that these heart-clots are the results, not the cause—the "*post hoc, non propter hoc*." Moreover, in many instances cited by M. Chevallier, Dr. Christison, and Mr. Barker, as quoted by Dr. Churchill, where sudden death occurred, no coagula were found in the heart; indeed, there was an unusual "emptiness" of its cavities.

We cannot perceive that any satisfactory solution is given by the hypotheses now mentioned. The syncope and collapse must be referred to some peculiar change in the nervous system, causing immediate cessation of the cardiac functions; the nature of which change is at present unknown. The words "fatal syncope," or "cardiac paralysis," will serve to indicate a simple fact, but will afford no explanation.

The *treatment of powerless labor*, therefore, must be regulated by the peculiarities of each individual case. As regards the general system, the important indication is to sustain the excitement, and invigorate the failing powers of the patient. The best stimuli are the preparations of alcohol and opium; these are invaluable, and should be freely exhibited. The sensibilities of the patient are so diminished that large doses are demanded, and must be often repeated. They will do no mischief, so long as their peculiar, specific influences are not manifested. Hence, strong brandy and water, in tablespoonful doses, should be exhibited every ten or fifteen minutes, while some preparation of opium may be given every hour or two, until the nervous symptoms are palliated, and evidences of narcotism are presented. If the vomiting be great, opium should be administered in the pilular form, or else some of its preparations should be thrown into the rectum. Other stimuli, according to the idiosyncrasies of the patient, or her peculiar circumstances, may occasionally be substituted; while concentrated nourishment, chiefly in the form of preparations of milk, fluid extracts of meats, etc., with the addition of condiments, may be given in small quantities, and at short intervals. The patient should be kept constantly in a recumbent position, with the head low, sometimes even pendant, and on no account be permitted, even for a moment, to be elevated, as a fatal syncope might ensue. Frictions and rubefacients should be sedulously applied to the surface; all mental and moral agitation should be most carefully avoided, and every encouragement, consistent with truth and duty, should be presented to the unfortunate patient.

Transfusion of blood from a healthy individual into the veins of the exhausted patient has been revived by

Dr. Blundell, and has been repeatedly resorted to, especially in Great Britain. Favorable cases have been reported, but its reputation has greatly declined. Its reputed success may seriously be questioned, as it is well known that after uterine hemorrhage women often recover, when the symptoms of collapse have rendered the case apparently hopeless. On the other hand, in many cases, where transfusion has been resorted to, patients have perished. The difficulty and delicacy of the operation, the time necessarily employed, and the danger arising from the accidental admission of air into the blood-vessels, or from the occurrence of phlebitis, are also strong objections to its employment.

Dr. Martin, of Berlin, has collected some fifty-eight cases, in forty-six of which it was reported that transfusion had been useful. Dr. Ramsbotham well remarks that it would be of no service while hemorrhage continues, and he would reserve its employment for those extreme cases of prostration, where all other measures have failed. MM. Cazeaux and Velpeau assert that it has not been successful in France. In this country it has been but rarely employed. Dr. Dewees considers it useless.

The *treatment of syncope*, during or after parturition, must be varied according to the character of this affection. If it be purely nervous or hysterical, few remedies are demanded; the recumbent position, fresh air, rubefacients, mild stimuli, and antispasmodics, are all that are requisite, care being taken that even these measures be not too long continued after reaction has ensued, for such reaction may become excessive.

Syncope, as one of the indications of exhaustion of the vital forces, is far more serious, and demands the powerful stimuli, narcotics, etc., as already recommended for exhaustion. They should be freely and steadily administered, until the consciousness of the patient is restored, and the pulse becomes excited.

Cases of "fatal syncope," or "paralysis of the heart," seldom afford any opportunity for treatment. Occasionally, where the symptoms are not so severe and more protracted, time is afforded for the free exhibition of alcoholic and narcotic stimuli, so as to revive, if possible, the energies of the nervous system, and prevent a fatal collapse. As such accidents occur unexpectedly, and appear sometimes the result of slight causes, great attention and positive injunctions should always be given to the parturient woman immediately after delivery. Nothing is more important than perfect rest in a recumbent position. On no account should the woman be elevated to a sitting posture, even for the evacuation of the rectum or bladder; and if any indications of faintness be observable, the sources of weak-

ness should be immediately ascertained and removed; and suitable restoratives be at once administered.

The *local treatment* must be regulated by the character of the existing complication. As a general rule, immediate delivery, always by artificial measures, is advisable. The exceptions to this rule are, where the prostration of the patient is great, and where the immediate cause is partially, or perhaps entirely removed. In such instances, it is best to palliate the urgent symptoms, and by nourishment and stimuli to restore, if practicable, sufficient strength to prevent the danger of collapse during the operation. If, however, the cause be operative, no time must be lost. Hence, if prostration be induced by hemorrhage, and the discharge continue, immediate delivery is essential. If the presenting part be still within the uterus, version by the feet should be employed. The os uteri, in such cases, seldom, if ever, affords any resistance; it may not be always dilated, but will be dilatable. If the practitioner should wait for a spontaneous dilatation, the patient, says Dr. Dewees, will perish. The uterine power is suspended, and no active dilatation can be accomplished; but, for the same reason, relaxation is great, and the hand of the practitioner can be carried into the uterus to effect version, and thus there is some hope that the patient may survive.

In cases of placenta prævia, Dr. Simpson advises to

remove the placenta, in order to arrest the hemorrhage, and then to wait for suitable reaction, before the child is delivered. If the head or breech have escaped the os uteri, the forceps or blunt hook may be employed. In cases of obstruction from deformities of the child or of the pelvis, craniotomy, or even the Caesarean section, may be imperatively demanded.

The *treatment after delivery* should be conducted with the most sedulous care, so as to avoid every additional source of irritation, and to mitigate, as far as possible, all inflammatory excitements, while the general strength is to be supported, and all nervous and vascular disturbances palliated by appropriate means.

If vascular reaction be inordinate, and fever exist, all active evacuations must be avoided. The strength of the patient must even now be supported by nutritious food, tonics, and sometimes by mild stimuli; while vascular excitement may be diminished by alcoholic lotions to the surface, by mild diaphoretics, diuretics, refrigerants, etc. Cold acidulated drinks will be grateful and useful.

During the protracted convalescence, which occasionally ensues, the most careful attention should be paid to renovate the strength of the patient by all the variety of hygienic and medical means, while special complaints, either local or general, must receive appropriate treatment.

CHAPTER XXVI.

DYSTOCIA.—COMPLICATIONS FROM THE MOTHER.—LOCAL AND GENERAL DISEASES.

THERE are numerous abnormal states of the pelvic organs, sometimes congenital, but usually the result of accident or disease, which may complicate labor, rendering it tedious, difficult, or impracticable. There are also various conditions of other organs of the body or of the general system, of so serious a character that when labor ensues, artificial delivery may become imperative. These morbid states, therefore, may be considered under the two divisions of Local and General.

LOCAL PATHOLOGICAL STATES.

These are very numerous; some are acute, and others chronic. Of the recent or acute morbid conditions, may be mentioned,

Serous Effusions.—The œdema so common in the lower extremities during pregnancy, very frequently extends to the labia externa, sometimes to the perineum, and occasionally, though not often, to the interior of the pelvis. The labia are sometimes enormously swollen; but this seldom, in our experience, interferes with delivery. Pressure of the child's head diminishes the distension, and the labia, diverging to either side, afford little or no impediment to the passage of the child. If the effusion be in the substance of the perineum, and at the orifice of the vagina, the resistance will be greater; but, even then, pressure of the presenting part scatters the effused fluid, and the perineum rapidly becomes thinner, so that the impediment to delivery usually disappears. Authors,

however, mention cases where the turgescence of the tissues is so great as to arrest the progress of the infant.

In the *treatment* of such cases, occasionally a free bleeding may be useful, as also warm bathing, warm fomentations, and warm rectal enemata. If the distension be great, punctures by the point of a lancet through the skin will serve to diminish the turgescence of the tissues. If there be serious delay, artificial delivery, by the forceps or otherwise, may become necessary.

Should such effusions exist within the pelvis, the same measures, excepting punctures, should be adopted.

Sanguineous Effusions.—These very universally result from great and constant pressure of the child, or are the consequences of contusions and lacerations of the tissues. Where the head is very large, or the pelvis small, the venous circulation is often so interrupted, that great congestions of the pelvic veins ensue, followed sometimes by the effusion of blood upon the vaginal mucous surface, or into the areolar tissue of the pelvis and external organs. Occasionally, vessels of some size are ruptured, and the infiltrations are enormous and extensive. M. Cazeaux records an instance where the effusion extended upward into the superior pelvis and the lumbar region, even to the diaphragm, as verified by the post mortem examination. Dr. Meigs was consulted in a case where rigidity existed during a first labor; and where the symptoms were exceedingly aggravated by the exhibition of ergot. When Dr. M. was called, the left side of the pelvis and the left labium were so distended with blood, that he had to make a free incision for the removal of the coagulum, and then effected delivery by means of the forceps. The child was dead, and the mother perished in a few days from erysipelas. When the blood is effused extensively into the areolar tissue, it sometimes partially coagulates, and the coagula formed may be sufficient to arrest the hemorrhage, by filling up the orifices of the ruptured vessels, and increasing the pressure of the surrounding tissues. There are cases, however, where the hemorrhage continues, causing exhaustion and death. Even when it has been arrested during labor, the relaxation of the tissues which supervene will sometimes be followed by fresh hemorrhage and further extravasation. In all these cases, owing to the injury sustained, there is danger of inflammation of a severe type, which may become gangrenous. Cazeaux states that Deneux reports that, out of sixty-two cases, twenty-two mothers and twenty-one children perished.

A bloody tumor, or *Thrombus*, from the same cause, is found sometimes in the labium, or in the

perineum, or within the pelvis. Such tumors arise, more frequently, from lacerations of the tissues, either from pressure of the child's head, or from rude attempts at delivery by the forceps or other instruments. The author was called to a woman in her first labor, where there was so much rigidity, that the practitioner undertook to deliver her with forceps of very bad construction. The attempt failing, the author was sent for. He found a large, bloody tumor distending the right portion of the perineum, blood being, at the same time, freely discharged from the vagina. Two inches within, on the posterior part of the vagina, was a longitudinal laceration, two inches in length. A similar laceration was also found behind the right descending ramus of the pubis; the scalp of the child, behind the ear, was also torn, and the bones of the cranium fractured. The woman was much exhausted. Delivery was effected by craniotomy; but the mother perished in a few hours, in consequence of her protracted sufferings and the loss of blood.

These are unusual cases; but, nevertheless, bloody tumors of more moderate size are not unfrequently met with: usually at the perineum, occasionally at the labium, and, rarely, in the cavity of the pelvis.

An infiltration of serum or blood is occasionally met with in the *cervix uteri*, most frequently on the anterior lip. It results when the os uteri is rigid and, at the same time, turned backward toward the sacrum; in this case, the uterine forces are directed chiefly against the anterior portion of the cervix, and force against the pubis. This, M. Cazeaux thinks, would interrupt the venous circulation sufficiently to cause the effusion of serous or sanguineous fluids, or the formation of thrombus or bloody tumor in the cervix uteri. It is reported that occasionally such tumors have communicated with the sinuses of the uterus; that they have sometimes ruptured during labor, and that the hemorrhage has been very profuse, and even fatal.

The *treatment* of these sanguineous infiltrations must vary according to their extent, their location, and the circumstances of the labor during which they occur. If moderate, and especially if seated in the labia, they require no special treatment; if located in the perineum, or within the bones of the pelvis, they form an obstruction to delivery, occasionally of serious import. If the blood remain fluid, or even if partially coagulated, the pressure of the head may cause its diffusion to a considerable extent. In some instances, the child may be delivered by the assistance of the forceps; while, in other cases, the tumefaction is so great as to demand that a free incision be made into the tumor, so that the watery parts of the blood may escape, and

the coagula be removed. If it be positively ascertained that the child is dead, craniotomy should be preferred to such incisions, inasmuch as these last are by no means free from danger. The division of the congested tissues would increase the hemorrhage, while the removal of the coagula in the cellular tissue might re-excite the bleeding. The great objection, however, to such incisions is the admission of atmospheric air, so that the blood, still confined within the meshes of the areolar tissue, will soon putrefy and become a source of great irritation, aggravating the natural tendency to inflammation which exists during parturition. Thus, erysipelatous and gangrenous inflammation may ensue. Nevertheless, such incisions are occasionally imperative, and sometimes are not productive of any ill consequences.

Where a thrombus is formed in the cervix uteri, no special attention is usually required, although the dilatation of the os uteri may be slow, yet eventually it occurs, and the head of the child passes without much difficulty. In some extraordinary cases, the blood may be evacuated by incisions.

Should the hemorrhage be profuse after such incisions, it can be arrested by cold water, ice, and astringents, especially when applied directly to the part by means of lint. If the uterus be powerfully contracted, and no bleeding from its cavity, a sponge tampon may

occasionally be employed in these hemorrhages from the cervix.

Displacements of the Bladder may retard or obstruct labor. When this viscus is very much distended with urine in its natural location in the hypogastric region, the sufferings of the patient are increased, and the uterine efforts are often more inefficient; while the bladder, compressed between the abdominal muscles and uterus, will be greatly irritated, and has, in some few instances, been ruptured, with, of course, fatal results.

In some rare cases, the bladder is pushed, before or during labor, underneath the uterus, and when distended forms a large swelling, occupying the cavity of the pelvis, and obstructing the vagina. In a case of labor, to which the author was called during the second stage, he found a large, fluctuating, soft tumor, pressing down toward the vulva; while the finger could, with difficulty, be passed under it to reach the os uteri, which last was found nearly dilated. The patient had suffered exceedingly from this complication, especially as the bearing-down efforts were strong. Dr. Ramsbotham gives an account of a similar case, with an illustration, a copy of which we present.

When the anterior wall of the vagina is much relaxed or elongated, this cystic tumor may descend to the vulva, and sometimes protrude externally, consti-

Fig. 105.



Dystocia from Displacement of the Bladder.—A. The Distended Bladder.

tuting what has been termed a "cystic hernia." This would aggravate the sufferings and the dangers of the patient.

The *diagnosis* is not difficult to the thoughtful and prudent accoucheur; but nevertheless, such swellings have been mistaken, says Merriman, for a hydro-

cephalic head, and also, as reported by Hamilton, for the membranes of the ovum; in both of which cases the bladder was punctured. It might also be mistaken for an ovarian dropsy, or for other encysted tumors of the pelvis. Hence, great caution should always be exercised, and no operation be performed until a catheter had been previously introduced into the bladder. The urine being evacuated, the cystic tumor will collapse, and all doubt of its character be dissipated.

The management of a labor with a misplaced bladder should be, therefore, carefully conducted. The patient should suspend all bearing-down efforts as much as possible, for fear the bladder might be seriously injured, or even ruptured, or the displacement be still further augmented. The urine should be evacuated as speedily as practicable by the catheter; after which, labor may be allowed to progress, or be assisted if necessary.

Prolapsus of the Vagina is certainly very rare during labor, inasmuch as the upper extremity of this tube is drawn up as the os uteri ascends upon the presenting part of the child, and as this passage is greatly distended when the head enters the pelvis. Cases, however, are recorded, where the vagina has protruded through the vulva, forming a soft but large tumor of a purplish color, from the engorgement of its blood-vessels. This tumor is reported to have so occupied the vulva as to be a serious obstacle to delivery, and in other cases it has become the subject of inflammation, and even of gangrene.

It results from an unusual relaxation and elongation of the vagina, and when, at the same time, great and continual pressure is made by the head of the fœtus. If the practitioner be early in attendance, prolapsus can generally be prevented by pushing up the relaxed tissue, and retaining it, until the head has descended; but, if this be impracticable, and the head be arrested, the forceps should be employed. It is reported by Velpeau that M. Rougemont found it necessary to make incisions in order to liberate the head; but this must be a rare necessity.

Hernia of the Intestines very rarely affords any impediment to delivery. The rectum, both in the pregnant and unimpregnated condition, occasionally protrudes at the posterior commissure of the vulva, constituting what is termed a rectocele. The distension of the vagina and the compression of the rectum by the head of the child will dissipate any such protrusion. Cases, however, are reported, where the upper part of the vagina has been so much relaxed, that portions of the intestines have extended the recto-vaginal cul-de-sac to such a degree as to form a tumor underneath the uterus. Dr. Meigs mentions a case where the "whole

pelvis" was occupied with a tumor thus formed. M. Cazeaux says that occasionally the omentum descends into the cavity. This epiplocele may be distinguished from an enterocele by a "clammy softness" very different from the elastic rumbling character of the intestines.

All such herniæ, when reducible, are easily managed, by pushing up the intestines or omentum, and retaining them until the head has descended. This operation may be facilitated by placing the patient upon her knees, with her chest much depressed.

Should the hernia be irreducible, the bowels should be well evacuated by enemata, or laxatives, and delivery be facilitated by the careful use of the forceps. There is much danger, in such cases, from subsequent inflammation, due to the pressure and irritation to which the tissues have been subjected. Hence, enteritis or acute peritonitis may ensue, which may prove fatal.

Hemorrhoids are very common during gestation, and often, therefore, exist during labor. They never afford an impediment to delivery, but may become a serious complication, in consequence of rupture, as they are often very large, and the hemorrhoidal vessels are numerous, and greatly developed. If the hemorrhage be very profuse, the process of labor should be hastened, and the hemorrhage restrained by cold applications and astringents, and, if dangerous, by means of ligatures.

Tumors.—Various kinds of tumors not unfrequently partially or completely obstruct the pelvic passages, rendering labor tedious, difficult, or impracticable.

Seybalæ in the rectum may be so numerous, hard, and compacted, as to occupy a large portion of the pelvis. The diagnosis is very readily established by exploring the rectum with a finger; nevertheless, such swellings have been mistaken for steatomatous, scirrhus, or other morbid growths. The treatment is very simple. Large enemata of warm water will usually soften or wash away these indurated fæces. Occasionally, mechanical measures are necessary; the finger is decidedly the best instrument for effecting their removal. The handle of a spoon has been recommended. A small-sized vectis will be preferable.

Calculus in the bladder is a more serious complication. When this is small, although it would aggravate very much the sufferings of the patient, and might even be productive of cystitis, yet delivery is not seriously impeded; as the calculus, when small, would be driven before the presenting part of the child, and expelled *per urethram*, or it would not encroach sufficiently upon the vagina to prevent the descent of the head. Even when large it may accidentally, or by the

assistance of the practitioner, be elevated above the symphysis pubis. If, however, it should be located below the cervix uteri, and remain fixed in the bladder, the complication is very serious, as the head cannot advance without causing contusion, and even rupture of the bladder.

The *diagnosis* can readily be established by introducing a "sound" into the bladder. When this is neglected, the fixedness of the swelling, its hardness and irregularities, have excited the suspicion of scirrhus or other heterogeneous growth.

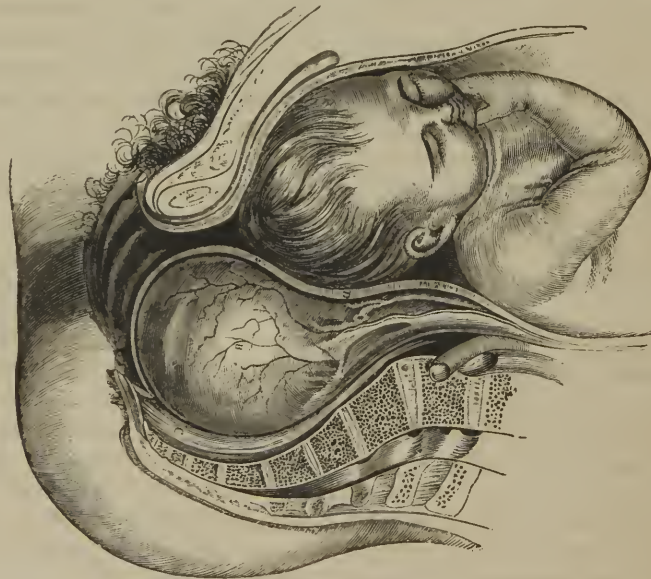
The *treatment* should, if possible, be instituted before labor ensues by extracting the calculus; as even when the stone is small, there is great danger of contusion and laceration of the cystic tissues during this process. After labor has commenced, the calculus should be pushed upward behind the pubis and into the hypogastric region. This will prevent any mechanical difficulty to the descent of the child, but the danger to the patient will not be entirely obviated; the powerful contractions of the abdominal muscles would so compress the walls of the bladder against the calculus that much mischief might follow. It would be better, therefore, for the patient to suspend the bearing-down efforts as much as possible, and for the accoucheur to hasten delivery by artificial measures.

When the stone is larger, and situated below the pubis, delivery may occasionally be effected by the forceps; but this would be a dangerous expedient, owing to the great pressure which would necessarily be made against the cystic tumor. In most cases, therefore, and always when the calculus is large, lithotomy should be immediately performed; an incision sufficiently large to remove the calculus should be made through the vagina on the median line, so as to avoid the ureters. After delivery, the opening in the bladder may sometimes heal readily, if this viscus be kept empty. Occasionally, sutures may be applied, as in the operation for vesico-vaginal fistula. Lithotomy, although not as safe an operation during gestation as under other circumstances, is here justifiable for two reasons: first, because the patient would have to submit to it, at some period; and, second, the attempt to deliver by forceps, or by craniotomy, is far more serious to the parent, and involves the life of her infant.

Encysted Tumors.—These are sometimes located in the labia, but being external, seldom interfere with the passage of the child, unless they should be exceedingly large.

Occasionally they are found immediately within the vulva, where they are sometimes connected with the glands of Duverney. Such tumors may exist on the

Fig. 106.



Dystocia from Disease of the Ovary.—A. Os Pubis. B. Enlarged Ovary. C. Rectum. D. Posterior Wall of the Uterus and Vagina.

sides of the pelvis, and also in the recto-vaginal septum. In all these cases they are generally simple cysts, movable, and of no great size. Cysts are, not unfrequently,

also detected in the upper part of the pelvis, especially in the recto-vaginal pouch. Here, also, they may be of simple character, but far more frequently they are

ovarian; an enlarged and diseased ovary having descended partially or completely into the cavity of the pelvis, behind the broad ligaments. Such cysts, as is well known, often attain an enormous size: hence, when they have fallen into the pelvis, nearly the whole of the cavity has, sometimes, been occupied, constituting therefore, a serious obstacle to the descent of the child.

During labor, thus complicated with encysted tumors, as the child is impelled forcibly into the pelvis, these cysts are compressed, the smaller ones are turned aside, or else, as is not unfrequently the case, they are ruptured, and their contents are discharged into the vagina or rectum, or may be diffused into the areolar tissue. The patient often does well, but the cysts thus ruptured may inflame, form abscesses, and even become gangrenous.

Should the cysts be large, such ruptures, if they occur, will be more serious in their consequences; and even when they remain unbroken, they will render the labor impracticable by the natural powers.

In ovarian cysts, there is always the hope that, as the head descends into the pelvis, the compression will determine the tumor out of the pelvis into the cavity of the abdomen, especially as its fluid contents may be forced from the pelvic into the abdominal portions of the sac. In other instances, where such displacement does not occur, the sac is ruptured, and its contents evacuated. In one case, which occurred to Mr. Langley, the rupture took place into the vagina, and several gallons of water escaped. It is probable that such ruptures may occur upon the peritoneal surface of the tumor, and fluid be deposited in the cavity of the abdomen. These ruptures of ovarian cysts are more dangerous than those just mentioned, as they are of greater size, as they interest diseased tissues, and as they involve the peritoneum. There is, therefore, more danger from inflammation, which may be seated either in the morbid tissues of the ovary, or in the cavity of the abdomen.

The *diagnosis* is generally very easy. A soft, elastic tumor, circumscribed, and seldom closely adherent to the surrounding tissues, can be readily felt. Care should be taken to distinguish any such tumor from hernia of the bladder, rectum, or small intestines, from the membranes of the ovum, from a hydrocephalic head, from hydatids, or from other morbid conditions of the ovum or child. The contents of these cysts are not always serous. They are sometimes gelatinous, oleaginous, or fatty; hence, they are more incompressible, and may often be mistaken for solid tumors, from which they can only be distinguished by puncturing with a needle or a trocar and canula.

The *treatment* of all such swellings, during labor, is simple, but not entirely devoid of danger. If the cyst be small, it may be neglected, as it will be compressed or pushed out of the way by the head of the child; if larger, it should be punctured through the vagina, as this will insure the discharge of the fluid through this canal, which is preferable to its extravasation into the areolar tissue, which might otherwise ensue; and, moreover, a small artificial opening will prevent the contusion and rupture of the cyst, and diminish the liability to subsequent inflammation. As a general rule, therefore, a puncture with the trocar and canula is preferable to delivery with the assistance of the forceps.

Where a large ovarian sac is detected, the practitioner should wait a considerable time before he ventures to puncture the tumor, endeavoring, in the meantime, to elevate it above the superior strait. Should the tumor be immovable, and large enough to prevent delivery, it should be punctured, rather than allow the child to perish or resort to cephalotomy. The danger of puncture, although involving the peritoneum, must be regarded as less than that arising from the rupture of the cyst. Such cases would not justify the Cæsarean section or embryotomy, if the child be living.

This operation of puncturing tumors of the pelvis is not to be confined to watery cysts, but should be employed wherever there is any suspicion that the tumor contains any gelatinous or caseous matters. Dr. Ramsbotham relates a case, where the tumor appeared almost solid, but, on puncture, a soft, "custard-like" discharge occurred, which, on exposure to the air, hardened: the tumor itself collapsed. If the swelling be still more dense, a caseous or fatty matter may, from the pressure of the head of the child or the fingers of the operator, be pushed out, so as to secure the collapse of the swelling.

After delivery, attention should be paid to prevent or moderate any subsequent inflammation.

Solid Tumors.—These are of a more serious character, especially when closely attached to the bones or to the periosteum, or when they are of a malignant character. These solid tumors may be located externally: if in the labia, or involving the nymphæ or clitoris, they seldom obstruct delivery; if, however, they be located in the perineum or in the cavity of the pelvis, they interfere more or less completely with the passage of the child.

These tumors vary as to their character. Many are fibrous. Some are steatomatous. They may also be developments of the lymphatic or other glands. Some are located in the areolar tissue, and are movable,

while others are intimately connected with the pelvic viscera or the sides of the pelvis. In some instances, they become very large; so that it is impossible for the child to pass through the obstetric canal. Similar tumors not unfrequently exist in the body, neck, or orifice of the uterus. In the former position, they prevent the regular development of the organ, are productive, it is supposed, of inertia of the uterus, and predispose this organ to laceration or rupture. In the cervix uteri, they become, if large, of still more serious importance, preventing the proper dilatation of the os uteri, and may, from their size, render labor impracticable, as occurred in the interesting case of Dr. Keating, which has already been noticed. (Page 288.)

The *diagnosis* should be carefully made. It should be ascertained whether the tumors are movable or fixed. They should be distinguished from exostoses, from scirrhus or cancerous degenerations, from scybala in the rectum, and from calculi in the bladder. When detected high up in the pelvis, their fixed and immovable character will usually enable the practitioner to distinguish them from tumors of the ovaries, or of the Fallopian tubes, or from displacement of the kidneys. When in the lower portion of the uterus, they should not be confounded with a polypous tumor, with thrombus or other soft swellings of the cervix, with induration or carcinoma of the os, or with any mal-condition of the fœtus. By a careful investigation, the obvious points of difference can be established. It is not always easy to determine, simply by the taxis, whether the tumors are fibrous or steatomatous, or whether they are "encysted." Should the least doubt exist, an exploring puncture may be made by a small trocar and canula, so as to ascertain, with considerable certainty, the character of the swelling.

The *treatment* is to be regulated on the general principles already detailed. When these tumors are very large, and cannot be removed, gastrohysterotomy, craniotomy, or the forceps may, according to the degree of obstruction, be the only resource of the accoucheur.

If the tumors be external to the bones of the pubis, it is seldom necessary to interfere; and even when located within the cavity of the pelvis, if they be not large, they may be so compressed, or pushed out of the way by the descent of the child, that delivery can be effected spontaneously, or at least by means of the forceps.

Should the size be larger, the removal or destruction of the tumor is of great importance for the safety of the infant and the welfare of the mother. When these tumors are isolated and movable, an incision, through

the vagina or perineum, will allow them to be readily detached and removed. When their adhesions are more intimate, closely connecting them with the bladder, vagina, rectum, or sides of the pelvis, the same operation, carefully executed, has sometimes succeeded. All these operations, however, are by no means free from danger, arising from the liability to laceration of the vagina or perineum, when the parts incised are distended by the body of the child; from the predisposition to inflammation, and especially from the occurrence of hemorrhage. The ordinary vascularity of the tissues of the pelvis is very great. This is exceedingly augmented, during gestation, by the immense development of their blood-vessels; and, in the present case, by the additional irritation excited by the formation and growth of these tumors. In the operation of extirpation, great care must be taken to avoid the large blood-vessels, and, after the first incisions have been made, to use the fingers on the handle of the scalpel, to detach the tumor from its connections. Generally, the hemorrhage will not be great, under these circumstances.

Should the removal be impracticable from the large size of the tumor, or from the intimacy of its adhesions, the tumor may be disintegrated, and so large a portion be removed, that the mechanical obstacles to delivery may be destroyed.

By one or other of these modes of operating, tumors, even of a large size, have been successfully removed from the pelvis, even after labor has commenced. The child, in some instances, has been saved, and still more frequently the mother has escaped the immediate and subsequent dangers of the operation. One of the most extraordinary cases of the kind is detailed by Dr. Burns. He has well designated it a "dreadful case;" and he deserves much credit for the boldness and skill manifested in its extirpation. The tumor occupied nearly the whole cavity of the pelvis, adhering anteriorly to the symphysis and to the left side of the pelvis around to the sacrum: it overlapped the brim of the pelvis, and was attached to the obturator muscle, rectum, and urethra. It was hard, irregular, and immovable; only a finger could be passed on the right side of the pelvis. Dr. B., after passing a catheter into the bladder, made an external incision on the left side of the perineum and anus, similar to that made for lithotomy, and by means of his finger, spatula, etc., succeeded in detaching the tumor from the urethra, rectum, and also, somewhat, from the sides of the pelvis. The mass was now grasped with the hand, but was immovable; a longitudinal incision was then made with a pair of scissors very nearly to its upper extremity, and the removal of the contents was accomplished by the finger, while the adhesions to the sides of the pelvis

were dissected off as closely as possible. Very little blood was lost. The contractions of the uterus rapidly increased, and in four hours a child above the average size was spontaneously delivered. The infant was dead; but the mother, after some peritoneal inflammation, recovered. In two months the wound was completely healed, and on examination per vaginam, the tissues were found in a natural condition, and there was no evidence, except the external scar, that an operation had ever been performed. Twelve years afterward she was reported to be in excellent health, but had never again been pregnant.

When these tumors are located in the *body* of the uterus, their existence can seldom be detected, unless they are very large. When known to exist, unusual care should be paid to the patient in facilitating the natural processes of labor, and artificial assistance should be rendered by the forceps or otherwise, if there be any unusual delay.

When the location of the tumor is in the *cervix* or *os uteri*, or, indeed, in the lower part of the uterus, positive interference becomes more necessary, and ought not to be long delayed. The accoucheur may safely wait to ascertain to what extent the orifice of the uterus will be dilated; but if this dilatation be not sufficient for the passage of the child, assistance must be speedily rendered after the rupture of the membranes, not merely for fear the child will be lost, but also to prevent the danger of rupture of the uterus, or the exhaustion of the mother's strength. Longitudinal incisions on the interior of the cervix will sometimes be sufficient; but generally a complete division of a portion of the cervix will be demanded, if there be any hope of a safe delivery. In other instances, craniotomy will be preferable for the sake of the mother. If, however, the tumor be large, the *os uteri* high up, and its dilatation very imperfect, gastrohysterotomy becomes the only resource, affording hope for the safety of the mother, and also of her infant.

When these tumors are smaller, and when they are located near the *os uteri*, the process of "enucleation" may be also adopted. M. Danyau reports a case, where a fibrous tumor, whose greatest diameter was six inches, and whose weight was subsequently ascertained to be twenty ounces, projected from the posterior lip of the uterine orifice. It was divided, and the contents sufficiently removed to admit of the descent of the child. M. Cazeaux encountered a still larger tumor of a fibrous character, which so filled the pelvis, that delivery was impracticable. The tumor was punctured, and afterward divided. Craniotomy was resorted to ineffectually; recourse was then had to version by the feet. This was successful, but not until the tumor had

previously passed through the vulva. The patient subsequently perished from exhaustion.

Hard ovarian tumors may also occasionally complicate delivery, by descending into the recto-vaginal pouch, underneath the neck of the uterus. These are generally reducible, and can be pushed up before labor, or even after its commencement. If, however, they be large, and especially, if irreducible, the complication becomes serious. No operation with the knife can be justified; inasmuch as the tumor may extend high up into the abdomen, and as adhesions would exist, threatening the most imminent danger of severe peritonitis.

The usual *treatment*, therefore, for obstructed labors should be employed, viz., artificial delivery by the forceps or blunt hook, by craniotomy, or by gastrohysterotomy. This last operation we should regard, in most instances, notwithstanding its great fatality, as less dangerous than to attempt the removal of an ovarian tumor, during labor, by an operation per vaginam.

Dr. Merriman says that, in some instances, where the tumor is not very large, it might possibly be removed by an incision per vaginam; but, for reasons just mentioned, this operation can seldom be justified.

M. Cazeaux refers to M. Puchelt's statistics respecting ovarian tumors—including both encysted and hard—complicating labor. Out of thirty-one cases, fifteen women and twenty-three children perished. One woman and twenty-one children died during labor. In five cases, where no assistance was afforded, four women and three children died. In one case, the child and mother were saved by pushing up the tumor; in a second case, the child died, but the mother survived. Version was performed twice—after pushing up the tumor—both children and one mother perished. Puncture of the tumor was made in three cases: one woman escaped, two women and three children died. Incision of the mass was practised in four cases: three of the mothers and one child survived; one mother and three children were lost. In one case, where the forceps was applied, the mother and child perished. Craniotomy was performed six times, three of the mothers only recovering. The blunt hook was employed in some instances, with safety to both parties. Dr. Merriman reports eighteen cases: of these, nine mothers died, three recovered imperfectly, and six completely; of the children, fifteen were still-born, and three survived. Dr. Litzmann reports fifty-six cases of the same kind: twenty-four mothers died, and thirty-two recovered; of the children, seven were born alive, thirty-five were still-born, and of the remainder, no account was given.

Tumors of the Fallopian tubes, and even of the kid-

neys, are reported to have descended below the brim of the pelvis, and to have obstructed labor. The diagnosis must be very uncertain, and the treatment should be conducted as recommended for hard tumors of the ovaries.

Polypous tumors do not always prevent fecundation, especially when their pedicles are attached to the os and cervix uteri. If the polypus be intra-uterine, gestation seldom occurs. In several such cases, which have occurred to the author, in married women, there was no impregnation. In one case, a lady, who had

been married for several years, without children, a large polypus was detected within the organ, and removed; she soon after conceived, and did well.

During gestation, polypi may exist, and continue to be developed until the full period, without much apparent injury. In other cases, the irritation and the hemorrhage, which they usually excite, bring on abortion or premature labor.

During labor, polypi may render the process tedious, difficult, or impracticable, according to their size; and sometimes they increase the exhaustion of the patient

Fig. 107.



Dystocia from a Polypus.—A. The Polypus. B. The Posterior Wall of the Vagina.

from the hemorrhage, which usually accompanies them, especially if their pedicle should be accidentally ruptured.

The *diagnosis* is not difficult. A hard, smooth tumor is found in the vagina, or within the cervix uteri, around which the finger can be completely passed, showing that no adhesions exist, except by its pedicle attached to the os uteri, or within the cavity of the organ. It thus can be readily distinguished from all the tumors which have been mentioned, and also from fungous growths, cancerous, or other morbid productions.

The *treatment*, during gestation, must be regulated by circumstances. As a general rule, no operation ought to be performed, for fear that abortion might be excited, or that the mother's dangers would be enhanced. If, however, the mother be exhausted, from the leucorrhœal and hemorrhagic discharges, her danger might be lessened by ligating the polypus, and afterward, if

necessary, removing the tumor by incision. Both mother and child may survive, although a favorable prognosis cannot always be made. In a case, which occurred to the author, a polypus, about the size of an egg, was removed during gestation, but, unfortunately, a miscarriage resulted; the mother did well.

During labor, spontaneous delivery may take place, where the polypus is small, or even if it be large, as the tumor will be forced, before the head of the child, through the orifice of the vagina. This happened in a very interesting case, which occurred to Dr. Rambotham, junior, where a polypus, which occupied the whole cavity of the pelvis and whose pedicle extended into the cervix uteri, was expelled prior to the passage of the infant.

Should the tumor be, however, retained, several plans may be adopted, according to the circumstances of the case. The removal, by incision, has been recommended. This was successfully practised by Dr. Bel-

ford, of New York, the child being delivered alive by the forceps, and the mother doing well. There can be no doubt, however, that this operation is not without risk, owing to the greatly increased vascularity of the uterus and tumor, excited by pregnancy and labor.

The ligature, therefore, seems preferable, and, after being firmly secured, the tumor can be removed, either by single or multiple incisions, as may be most convenient.

As uterine irritation may, however, ensue, even after this simple operation, it would seem desirable merely to bring the polypus outside of the body of the woman prior to the delivery of the child, when the bearing-down efforts of the mother are not adequate. During the second stage of labor, the tumor, if not sooner removed, is necessarily forced upon the perineum, and against the vulva, so that the neck of the polypus must be somewhat elongated, although the uterus, by the abdominal muscles and diaphragm, is forced lower into the pelvis. Under these circumstances, by means of the vectis, or even of the forceps—great care being taken not to injure the child—the polypus, unless very large, might be extracted, allowing, therefore, the escape of the infant.

After delivery, the question is not decided whether the polypus should be left undisturbed, or whether it should be immediately removed. Its extirpation, by knife or ligature, although a very simple operation in itself, is by no means free from danger. This arises from the usual irritability of the pelvic tissues after delivery, and from the engorged condition of their blood-vessels. Hence, pain, inflammation, and other bad symptoms may ensue. Thus, in Mr. Fordham's case, where the ligature was applied after delivery, the woman perished. Dr. Ramsbotham, in the case above alluded to, after a consultation with his father, deferred the operation for four months; during this period, the immense tumor, which existed during labor, gradually diminished to the size of a walnut. It was then readily removed by ligature, and the woman did well.

In favor of immediate operation it is urged, that the presence of the polypus is a source of irritation to the uterus, that it augments the lochial, leucorrhœal, and hemorrhagic discharges, and thus contributes to the disturbance and exhaustion of the patient. Moreover, if the ligature be employed, it is effectual in arresting the hemorrhage; and no pain is excited, as there is no sensibility in the polypus, while any bad consequences which might ensue from the putrefaction of the polypus, can be in a great degree obviated by cutting off the tumor below the ligature. There

are cases, therefore, where immediate removal may be preferable.

Scirrhus and carcinomatous tumors may be located in the external organs, at the orifice of the vagina, in the cavity of the pelvis, and also at the os and cervix uteri.

When such tumors interest the clitoris, the nymphæ, or labia, they seldom afford any impediment to delivery which cannot be overcome by the natural powers, or with some assistance from the forceps. Scirrhus indurations at the orifice of the vagina, especially when near the perineum, may so arrest the progress of the child as to demand artificial measures. After waiting, therefore, as long as may be prudent to the child as well as to the parent, the forceps may be used, or the blunt-hook, according as one or the other extremity of the foetal ellipse may present; or, if the contraction be great, incisions on each side of the perineum may be requisite to prevent rupture.

Indurations, involving the urethra, vagina, or rectum, demand similar treatment. Incisions, however, are very rarely necessary or proper.

It has long been known that cancer of the neck of the uterus will not always prevent pregnancy. During gestation, however, the irritation and pain will not unfrequently produce abortion or premature labor. When labor occurs at term, the dilatation of the os uteri is painful, tedious, seldom complete, and often impracticable, especially where the whole circumference of the neck is diseased. Much, however, may be expected from the natural process of relaxation, assisted by the continual recurrent contractions of the uterine fibres. Children have often been born alive when, at the commencement of labor, the orifice of the uterus seemed to be almost closed by the induration of the tissues. The author met with an instance where the whole anterior semi-circumference of the neck was thickened and swollen by a cancerous degeneration; yet, after a few hours, the dilatation was so complete, that a large infant was spontaneously delivered. The mother survived, and was in comparatively good health for three months, affording sufficient nourishment for her infant. The disease then increased rapidly, and, at the end of four months after delivery, she died.

Where the natural efforts are not adequate to effect dilatation, resort may be had to the judicious use of compressed sponge or to the caoutchouc dilators of Mr. Barnes; or, if other measures fail, to multiple incisions on the inside of the cervix. In some extreme cases, the question of vaginal or gastro-hysterotomy would have to be entertained. This last operation may possibly be undertaken, in these unhappy cases,

chiefly for the welfare of the child, as the life of the mother must, in any case, soon terminate.

Gestation and labor, no doubt, hasten the progress of carcinoma; and such women often perish during parturition, though others survive for a longer or shorter time. The fatality to children is also great. M. Cazaux reports the statement of M. Puchelt, that fifteen out of twenty-seven children were still-born.

Fungous, cauliflower or other soft excrescences from the cervix uteri, can seldom impede labor, and, if necessary, can be readily removed by the knife or ligature.

Inflammation.—*Acute inflammations*, whether of the phlegmonous or erysipelatous character, although of serious import to the health or even the life of the mother, can seldom afford an impediment to delivery. If the opportunity occur, they should be actively treated before the commencement of labor. If this process has begun, evacuating remedies, fomentations, poultices, indeed, all the measures formerly detailed for the treatment of "rigidity," should be immediately adopted, so as to relieve, as far as possible, the density of the tissues and hasten relaxation. Artificial delivery may sometimes, though very rarely, be demanded.

The *consequences of inflammation* very frequently present difficult and even insuperable obstacles to delivery.

Large abscesses externally, in the cavity of the pelvis, or even in the neck of the uterus, are occasionally observed. Like encysted tumors, they are to be opened by punctures or even by free incisions. They are seldom productive of any subsequent mischief.

Adhesions, indurations, and other alterations of the pelvic tissues, may result from inflammation. In some rare cases, there will be found a cohesion of the internal or external labia. These can hardly occur, unless these tissues have been previously incised, ruptured, or ulcerated, and hence are seldom observed. They are more frequently congenital. The vulva is very rarely completely closed; partial separation existing for the passage of the urine, and, it may be, of the menses. The closure, however, may be sometimes so complete as to prevent impregnation. If cohesion of the external labia exist, an incision with the knife will usually be demanded.

Contractions of the orifice of the vagina are often the result of severe inflammation: all the tissues become thickened and indurated, greatly diminishing the opening, and affording, in some instances, an insurmountable obstacle to delivery. Such strictures of the orifice occasionally originate in the unimpregnated condition, but more frequently are the results of a previous labor, where the parts have been greatly irritated, contused, or lacerated. In a large majority of

cases, however, where lacerations of the perineum have taken place, no severe or extensive inflammation is apt to ensue; the wound heals readily, under a moderate degree of inflammatory action, so that but a trifling induration of the surrounding tissues remains, and a cicatrix, generally of small size, is the chief evidence of the injury previously sustained. Hence, in subsequent deliveries, no difficulty ensues; on the contrary, owing to the rupture of the perineum, sometimes extending even to the anus, the orifice of the vagina is much enlarged, so that the child is not delayed at the external outlet.

Contractions of the whole vaginal tube also often supervene after difficult labors. The walls of the vagina are firm, thickened, and incapable of distension by the finger. The degree of constriction varies; but sometimes, even where pregnancy has taken place, it is so reduced, that a probe can with difficulty be admitted. This "atresia" is sometimes so great that the canal of the vagina is completely obstructed, occasionally, through its whole extent. In other instances, there is much less induration of the tissues, but considerable obstruction from cicatrices or bands, which project into the vagina, or pass from one surface to the other, or occasionally there is direct cohesion between the opposite sides. All these varieties are generally the result of previous laceration of the tissues, and the contractions which follow the process of cicatrization.

These inflammatory indurations are not always confined to the vagina, but often involve the *bladder*, the *rectum*, and the surrounding tissues. Thus, in the case reported by M. Lombert, of Geneva, owing to an injection of sulphuric acid during gestation, with criminal intent, the tube was found obliterated, and the bladder fused into the rectum; and Cruveilhier has met with a similar case, in which, from an injection of a solution of corrosive sublimate, the canal terminated in a cul-de-sac, about an inch from the meatus urinarius.

Ruptures of the vagina, as formerly remarked, often interest the bladder or rectum, which, if the patient survives, will be followed by vesico-vaginal or recto-vaginal fistula; occasionally, the whole lower part of the bladder, and sometimes the anterior portion of the rectum have sloughed away, so that a common cloaca or pouch is formed for the reception of the urine, feces, and the menses.

The *os uteri*, in a very few instances, has been found *completely closed* at the time of labor. Owing to the fact that impregnation has taken place, such closure must have occurred during the pregnant condition, and resulted from excessive inflammation from previous ulceration, or from some wound or laceration, by

an accidental cause. M. Velpeau was called to a case under the care of M. Caffé, where the patient had been ten days in labor, and yet no os uteri could be detected. A triangular cicatrix occupied its original location. This state of things resulted from an injection of caustic lye into the vagina, by the patient, to excite abortion.

Agglutination of the lips of the orifice of the uterus by a semi-membranous matter, and yet so firm as to resist, for a long time, the natural process of dilatation during labor, is said to have existed more frequently than the permanent closure of the orifice. M. Nægélè considers these agglutinations as the result of inflammation, and as being, therefore, analogous to the membranes formed by this process on the serous tissues. In a large proportion of cases, however, inflammations of the os and cervix uteri are followed by the formation of *strictures* or indurations, preventing, or at least impeding the dilatation of the os; and, of course, the descent of the infant.

Strictures, contractions, obliterations, and other malformations of the vulvo-uterine canal, are occasionally congenital. In some instances, the hymen is perfect, retaining the menses, as well as preventing impregnation. In other cases, it is very strong and thick; but, as the natural opening exists, conception has sometimes ensued. Delivery, however, is opposed by the unyielding character of the hymen. Occasionally, transverse membranous partitions are found in the vagina at a greater or less distance above the hymen, sometimes perfect, so that the menses are retained; but in other instances a small orifice exists sufficient to allow the exit of the menses, and the access of the semen masculinum to the uterus. Allusion has already been made to two such instances, one in the unimpregnated woman, and the other during labor. In both, the tissues seemed perfectly healthy, but there was no apparent opening in the membranous partition, the lower part of the vagina being a cul-de-sac, and the upper an apparently closed cavity below the uterus.

These vaginal septa sometimes run longitudinally, dividing the tube into two lateral portions. Such double vaginæ do not prevent conception. Dr. Meigs mentions two cases, which he examined during labor.

The vagina, at birth, is sometimes entirely wanting, or its lower orifice is found in the rectum, in the bladder, or even on the surface of the abdomen. In one instance, where a woman was in labor, under the care of M. Rossi, there was a total absence of the external genital organs; but, after some time, a small orifice was detected on the side of the anus, so minute as hardly to admit a fine probe. M. Portal relates a

case, where there was a small opening at the vulva, through which the urine alone was discharged, while the menses were always passed per rectum. The woman became pregnant, and yet, during labor, the external opening was, gradually, so much dilated as to allow the passage of the infant. M. Velpeau details an instance, where the vagina had no other termination but in the rectum. The woman, nevertheless, conceived, and the child was delivered per anum.

The progress of labor, in all these cases of stricture or atresia of the vagina, and of the cervix uteri, must be very tedious, difficult, and, in some instances, impracticable. It is wonderful, however, what changes occur, during labor, and how frequently children are born alive, even when the passages have been greatly contracted, and much indurated. The natural disposition to relaxation is manifested, even in these dense tissues; and, under the influence of the pressure of the child, they yield, so that delivery can be accomplished, sometimes without any rupture, although, most frequently, some portion of the tissues are lacerated. Thus, Plenck mentions a case, where the vagina was so contracted, that even the little finger could not be introduced; and yet, after eighteen hours, the child was born spontaneously, without any rupture of the vagina, or of the external genitals. Merriman also details an example, where the finger could hardly be introduced, yet the woman delivered herself in thirty-six hours; she, however, perished, and a post-mortem examination showed a slight laceration of the vagina.

The same disposition to yield is often manifested, also, at the neck of the uterus. Dr. Churchill mentions a case, where the woman was in labor forty hours before the os uteri could be detected, and then it was only the size of a crow's quill; yet delivery ensued without assistance.

These examples, although they confirm the observation, that great relaxation of these diseased tissues may be expected on the occurrence of labor, must be regarded as exceptional, inasmuch as artificial assistance will, very generally, be required, and the termination of the labor, where there is much constriction, is often unfavorable to the child, and, not unfrequently, to the mother.

The *treatment* must be founded on the facts now presented. Wherever the canal of the vagina still exists, however small, the hope may be entertained of effecting delivery. All measures, suitable to facilitate the natural disposition to relaxation, should be sedulously adopted, as early as possible. Dr. Dewees speaks, in the highest terms, of venesection, carrying it often to faintness. He first adopted this practice in 1796, with the happiest results; and was afterward so suc-

cessful, that he entertained the hope that it would always answer. This, of course, has proved illusive; nevertheless, if the patient be vigorous, one or two bleedings will greatly promote relaxation, and, at the same time, diminish the tendency to subsequent inflammation. Other evacuating measures will be useful, assisted by warm baths, fomentations, and, especially, by warm mucilaginous injections per vaginam, which should be often repeated, and also aided by narcotics. Dr. Keating states that opium and anæsthetics favor relaxation in these cases.

Dilatation of the contracted passages may, also, be attempted. There is no time for the slow operation of bougies, or of cylindrical, spherical, or other forms of pessaries. Much may be expected from the employment of the caoutchouc bag, distended by water or air, so as to produce as much pressure as the sensations of the patient will tolerate. Perhaps more may be anticipated, in these cases of atresia vaginæ, from tents made of compressed sponge. These will soon soften in the vagina, and contribute to its dilatation, without exciting much irritation. The size of the sponge tents can generally be rapidly increased.

These measures should be persevered in during the whole of the first stage of labor, and during a portion of the second stage, until, at least, the head has descended partially into the pelvis. If the natural powers are not then adequate to overcome the obstructions, it will be best to resort to incisions with the knife or scissors, directed upon those parts, where the contraction is most unyielding, or where distinct bands or cicatrices can be felt. Slight cuts, in different parts, are not only safer, but more efficient than one deep incision. Care should always be taken to avoid important tissues, such as the bladder and rectum, and also the large blood-vessels. Experience confirms the idea, that such incisions are less dangerous than spontaneous lacerations. In some instances, additional assistance must be rendered by the forceps, by the blunt hook, or by version, and, occasionally, craniotomy will be demanded.

In strictures and contractions of the os uteri, the same treatment will be found equally advantageous. The dilatation of the os uteri may be hastened by the sponge tent, or by the caoutchouc dilators; or, should these fail, multiple incisions with the knife, or vaginal hysterotomy will be necessary for the safety of mother, as well as of the child.

When labor is resisted by a *dense hymen*, crucial incisions may answer. Some practitioners advise that even the whole membrane should be detached from the circumference.

When a transverse partition is detected in the

vagina, the process of labor may be allowed to continue, until this septum is greatly distended. At this time, by means of the finger, or speculum, an orifice can generally be detected; or, at any rate, a thin portion of the septum, which may then be carefully punctured. The opening can now be dilated, usually with great facility, by means of bougies, or the finger, so as to remove any further obstruction to the descent of the child.

In the case of *double vagina*, it is best to divide it through the whole length, and not trust to its being lacerated by the pressure of the child.

Where there is a perfect *closure of the orifice of the vagina*, incisions through the perineum become, very universally, necessary. A few exceptions to this rule may be found, where the vagina opens into the rectum, as in the case we have quoted as having occurred to M. Velpeau; and also in the case from M. Portal, where, although the menses were discharged per rectum, yet the child was spontaneously delivered through an orifice, near the pubis, previously very small, through which the urine alone had been evacuated. Incisions, when required, should be made though the anterior perineum, with great care, so as to avoid injuring either the urethra or rectum, until the ovum is reached. M. Rossi, in the case above mentioned, where there was an absence of the external organs, succeeded, by these means, in effecting the delivery of a child which survived seven hours.

Occasionally, an operation with the knife becomes necessary where there is a closure of the canal of the vagina, by severe inflammations excited during pregnancy.

Where there is simple agglutination by membranous substance *at the lips of the os uteri*, if the natural process of dilatation be not adequate, a simple puncture or slight incision will be sufficient to liberate the head. In the rare cases, however, of perfect occlusion of the os uteri, crucial incisions, with the knife, will be demanded, and the hope may be entertained that both the child and its mother will be saved.

In all these operations with the knife, in cases of constriction or cohesion in the vagina or neck of the uterus during labor, there is imminent danger that lacerations may ensue, which, from their extent or direction, may interest important tissues or organs, so that life may be jeopardized from exhaustion, or from hemorrhage or inflammation.

After delivery, the disposition to inflammatory action and fever must be palliated by appropriate measures. Frequent warm mucilaginous injections into the vagina are very valuable. When cicatrization commences, the strong disposition to contraction should

be obviated as much as possible. This is effected, as regards the vagina, by the occasional introduction of gum-elastic, wax, or metallic bougies, best, however, by means of sponge tents or the colpeurynter. Cylindrical, ovoid, or spherical pessaries may often be employed advantageously. The author has used conoidal metallic pessaries furnished with stems, so that the patient could introduce or remove them at pleasure,—their size being gradually increased if no injury be produced.

As regards the os and cervix uteri, the frequent passage of large sounds during the process of healing is preferable to the constant use of the intra-uterine stem pessary of Dr. Simpson; or, if necessary, the sponge tent or the caoutchouc tubular bags, distended, might be advantageous. In all cases, however, the disposition to contraction is so strong, that it can with difficulty be counteracted.

Before labor a similar treatment should, if the opportunity occur, be instituted in all cases of atresia vaginæ during pregnancy. The natural predisposition to relaxation at the end of gestation should be facilitated by suitable measures; while dilatation of the canal should be promoted by caoutchouc dilators, sponge tents, bougies, pessaries, etc. The employment of the knife in all cases of constricted vagina should, except in extreme cases, be avoided. Incisions have no influence upon the whole circumference of the canal; their effect is confined to the parts cut; the passage is enlarged simply by the separation of the lips of the wound thus made. The subsequent inflammation will be again followed by contraction, and little or nothing, therefore, is permanently gained; and, moreover, the proper mucous tissue of the vagina, divided by the incision, is not restored: its place is supplied by a dense cicatrix. On the contrary, by sponge tents, pessaries, and other dilators, the tissues of the canal are gradually developed without solution of continuity, to the permanent welfare of the patient.

GENERAL PATHOLOGICAL STATES.

Pathological conditions of the mother may retard, or even arrest, labor; not merely by presenting obstacles to the descent of the child, but also by interfering, more or less completely, with the powers by which the important function of parturition is executed. These powers are either uterine, or dependent upon the abdominal muscles and diaphragm.

The *uterine powers* may be disturbed by *acute* or *chronic affections*.

Among the former, *irritability* of the uterus, whether purely neuralgic or rheumatic, often complicates

labor. Irritable uterus, in the unimpregnated state, is a cause of various neuralgic, spasmodic, and hysterical conditions. During pregnancy, as formerly mentioned, it is productive of much soreness, pain, and distressing nervous affections. During labor, the sufferings are very great in proportion to the degree of contraction of the uterine fibres, disturbing exceedingly the cerebro-spinal system of nerves, and, hence, they are productive of restlessness, oppression about the heart and lungs, with great cerebral excitement. The woman becomes hysterical, and often delirious, with neuralgic and spasmodic affections, which not unfrequently terminate in convulsions. In all cases, the bearing-down efforts are imperfectly performed, as the patient is afraid of increasing her sufferings, or has not sufficient control over her muscular system. Thus, labor is impeded from the want of such efforts; while, owing to this increased irritability of the uterine tissues, there is more or less spasmodic action at the neck and orifice of the uterus, constituting, as already detailed, one of the varieties of rigid os uteri.

The *treatment* of this irritability of the uterus is, therefore, to be conducted in the manner indicated for rigid os uteri dependent upon nervous irritation. Hence, an occasional resort to the lancet and nauseating medicines, after every aggravating cause of nervous irritation has been removed, is sometimes useful. The dependence of the accoucheur, however, should be chiefly upon narcotic and anæsthetic measures, to diminish all this inordinate excitement.

Acute inflammation of the uterus, or its appendages, the broad ligaments, the Fallopian tubes, the ovaries, etc., may, in some rare instances, disturb the uterine functions during labor. It will demand positive and sometimes active depletion to prevent serious mischief; and this is to be followed by the free use of opiates, or by etherization.

Artificial delivery, after the os uteri has been fully dilated, may often be required in these states of irritable and inflamed uterus.

Chronic diseases of the uterus, productive of more or less alteration of its tissues, occasionally complicate labor. Hence, thinness of the walls of the uterus, indurations, abscesses, ulcerations, and cicatrices of portions of its parietes, or the presence of fibrinous, steatomatous, or carcinomatous tumors, may induce inertia, requiring, in some instances, the employment of oxytocic remedies. These, however, are not always safe, and hence, artificial delivery, after the expiration of the first stage, is usually to be preferred.

The *accessory powers* are still more frequently disturbed by morbid states of the patient, both acute and chronic.

Among the *acute* diseases may be mentioned,

First. All the varieties of nervous affections, such as hysteria in its Protean forms, with neuralgic and spasmodic disorders, with asthma, palpitations of the heart, nervous delirium, etc.

The *treatment* of these various affections need not again be detailed.

Second. Febrile and inflammatory complaints are not unfrequently coexistent with the parturient process. When treating of abortions and premature labors, it was mentioned that these accidents are the result, in many instances, of febrile diseases, especially when there is a tendency to a fatal termination. Should they unfortunately exist during labor, the severity of their symptoms is augmented, and prostration and death are too frequently accelerated. Hence, the occurrence of labor, when women are suffering from remittent, typhoid, and congestive fevers, or from rubeola, scarlatina, variola, or other exanthematous diseases, is usually very unfortunate. Labor, however, is not generally severe, and often very short, being accomplished without much difficulty.

The explanation of the suddenness and facility of parturition, in these exhausted states, can, we think, be explained by the great diminution of nerve-force, and the consequent great relaxation of the muscular fibres of the os and cervix uteri, and of the perineal tissues, so that comparatively trifling contractions of the uterus will rapidly accomplish delivery. We have not observed the "excessive uterine action" which Dr. Tyler Smith and others mention as existing in such cases; neither can we perceive that there is any connection as cause and effect between "blood-poisoning" and such rapid deliveries. It will not be irrelevant to remark, that the rapid labors, which are observed in cases of asphyxia, from suffocation, drowning, etc., are dependent upon the same sudden prostration of the nervo-muscular action of the cervix uteri, and muscles of the pelvis; there is no evidence, however rapid the process, of powerful contractions of the body of the uterus. The child is delivered, during asphyxia, by moderate uterine efforts, owing to the disappearance of resistance in the obstetric canal, precisely analogous to those well-established cases, where children have been born after the death of the mother. We can perceive, therefore, no propriety in referring to "the oxytotic effects of the carbonic acid retained in the blood" to explain, in part or in whole, the rapidity of such deliveries.

Acute inflammatory diseases, whether existing in the cavities of the abdomen, thorax, or cranium, or involving, to any great extent, the muscular system, as in cases of rheumatism and gout, must interfere necessa-

rily with the bearing-down efforts during parturition. Dilatation of the os uteri and some expulsive efforts of the uterus may be effected by the contractions of the muscular fibres of this organ; but the labor will be tedious, as the abdominal muscles and diaphragm cannot act efficiently under these circumstances. The sensations of the woman will deter her from making any attempt, or render such attempts very inefficient.

The tediousness of labor is by no means a chief element of mischief. The reflex influences of the parturient process upon the progress of inflammation in the diseased organs is often of most serious import. If, for example, at the time of labor, severe pneumonia should be present, which implies the existence of acute congestion of the lungs, with disturbance of their functions, as manifested by shortness of the respiration, great oppression and cough, and often by accumulation of serous, mucous, bloody or purulent deposits in the bronchia, it is evident that all these phenomena must be greatly aggravated by labor. The muscular contractions of the uterus, the severe pain, the action of the abdominal muscles, the disposition to "hold the breath," and all the nervous and vascular excitements incident to the parturient process, will increase the congestion of the lungs, augment the oppression, and the disposition to effusion in the bronchial tubes. Hence, the whole disease is rendered more severe, and its progress more rapid. The patient, indeed, may perish immediately, from this apoplectic condition of the organ, or from the quantity of the effusions of blood, mucus, or pus, in the respiratory passages.

Similar results would be manifested in cases of acute inflammations of the heart and of the brain, or of its membranes, modified by their anatomical and physiological characters.

Should inflammatory affections exist in the cavity of the abdomen, or in its muscular tissues, the symptoms and danger will not be so great; but, nevertheless, all such affections will be aggravated by the parturient efforts.

Two very important indications are to be fulfilled in the *treatment* of these complications:—

First. To diminish, as rapidly as possible, all such acute inflammations and congestions; and,

Second. So to conduct the labor as to lessen its deleterious reflex influences upon the diseased organs.

The *first* indication can alone be fulfilled by a decided evacuating treatment. If there be any case, where patients can tolerate free bleeding, it must be where acute inflammation exists in the vital organs when aggravated by all the nervous, vascular, and muscular excitements incident to the process of labor. The lancet alone can save life in most of these cases;

no time is left for the operation of other evacuants; direct and copious depletion can alone prevent the lesion of the organ. The relief to the patient is immense: she evinces it, not merely by her warm expressions, but by the diminution of the dyspnea, oppression, pain, and vascular excitement, followed by more free perspiration, and a more copious expectoration. It is useless to specify the quantity of blood which may be taken; this must depend on the judgment of the practitioner in each individual case. There can be no doubt that small and frequent bleedings are very inefficient, and, of course, dangerous; the vein once opened, should not be closed until there is decided relief to the suffering organ.

Cups and leeches are useful as adjuvants, but cannot be trusted as substitutes for the lancet.

Direct evacuation should be followed by a full dose of calomel, or some other mercurial preparation. Subsequently, diaphoretics, laxatives, revulsives, etc., become advantageous. Narcotics should seldom be administered until the urgent symptoms from congestion are greatly ameliorated.

The same kind of practice should be instituted, in a more moderate degree, where the inflammation is located in less important organs, as immediate danger is then not so great. The same practice, as we have frequently intimated, should also be adopted where there is great congestion of the heart, lungs, or brain, even if no inflammation be present. Evacuations by the lancet arrest or prevent hemorrhagic effusions by diminishing or relieving the congestion which precedes such accidents.

The *second* indication, as to the proper management of the labor, demands special attention, so that this process shall disturb, as little as possible, the inflamed organ.

During the first stage of labor, all sources of irritation in the bladder, stomach, bowels, etc., and all mental and moral excitements, must be carefully removed. Free bleeding, and the other evacuants just recommended, will greatly tend to moderate the pain and irritations arising from uterine contractions, and will favor the relaxation of the os uteri and perineum. This relaxation should be facilitated by warm fomentations, poultices, rectal and vaginal enemata.

During the second stage, the practitioner should endeavor to calm the mental anxieties and sufferings of his patient, and urgently insist that she should make not the least effort; positively forbidding any straining or bearing-down, and assuring her that no such effort is requisite, but that he himself will accomplish the delivery.

Artificial delivery, therefore, should, in all instances, whether there be any other complication or not, be the

recourse of the practitioner, excepting, of course, in those few cases where labor advances rapidly by the mere contractile powers of the uterus. The forceps in cephalic presentations, and the fillet or the blunt hook in pelvic presentations, should always be preferred to version; this last operation should, for obvious reasons, be restricted to trunk presentations, and, in many of these, the necessity for the introduction of the hand into the uterus may be prevented by external or internal manipulations.

Chronic diseases often complicate labor. In the cavity of the abdomen, chronic inflammation of the stomach, bowels, peritoneum, liver, etc., enlargements of the spleen, liver, kidneys, ovaries, the existence of hernia, the collection of water in the cavity of the peritoneum or in ovarian cysts, and other chronic complaints, will, by distending the abdominal parietes, or, by acting as sources of irritation, occasionally arrest the progress of gestation, exciting abortion or premature labor. During labor, also, they often render the process tedious, as they may contribute to inertia of the uterus, or prevent proper action of the abdominal muscles and diaphragm.

In the thorax, chronic pleuritis, pneumonia, bronchitis, carditis, etc., the existence of abscesses, of dropsies, of aneurisms, and of phthisis, may not only retard the process of delivery, but may, in some instances, become exceedingly dangerous. Such dangers arise from direct exhaustion, from congestions and effusions, or from sudden rupture of abscesses, or aneurismal tumors, so that death may ensue almost instantaneously.

In the head, chronic inflammations of the brain or its membranes, the existence of congestions, effusions, "softenings," or abscesses, would prove equally detrimental, and sometimes as rapidly fatal, as the analogous affections of the chest.

The management of labor, in all these unfortunate complications, should be regulated on the general principle of restraining, as far as practicable, the spontaneous efforts of the woman, and of substituting the artificial assistance of the accoucheur. It will frequently happen that no assistance will be required; the emaciation, debility, and the exhaustion frequently coexisting in these chronic maladies, so favor the relaxation of the obstetric passages, that the deliveries are short, requiring the exercise of moderate expulsive power. Hence, as is well known, consumptive women generally have easy labors. When, however, there is any delay, the employment of the forceps, or other appropriate measures, will prove of the highest importance, often serving to prolong the life of the mother, and, still more frequently, perhaps, of insuring the life of her child.

CHAPTER XXVII.

EXTRA-UTERINE PREGNANCY.

GESTATION, as was formerly mentioned, may be normal or abnormal. In the former, the ovum is developed in the cavity of the uterus, in the latter, out of the uterine cavity. Natural or uterine pregnancy, in all its variations and complications, has now been fully considered. In the second variety, or abnormal or preternatural pregnancy, the ovum never reaches the cavity of the uterus, but is developed exteriorly, sometimes in the ovaries, sometimes in the walls of the uterus, or finally, in the cavity of the peritoneum, constituting the four essential varieties of extra-uterine pregnancy. These have been, apparently unneces-

sarily, subdivided according to the position in which the ovum may be found in relation to more than one of the above-named locations: sometimes, for example, the ovum is found covered with the tissues of the ovary, and also with those of the tube; or by the exterior wall of the uterus, in conjunction with the tissues of the Fallopian tube. These are refinements of little practical value, and probably are consequential, ensuing on the development of the ovum and the necessary adhesions with the surrounding parts.

Ovarian Pregnancy.—By ovarian pregnancy is meant the retention of the fecundated ovum within the

Fig. 108.



Ovarian Pregnancy.

vesicle of the ovary, so that, as it enlarges, its proper tissues receive a covering from the peritoneum, and eventually, also, from its adhesions to the surrounding parts. Why ovarian pregnancy should ever occur must be problematical. We can easily imagine a preternatural strength in the connections between the ovule and the granular body or other portions of the

vesicle, or an unusual thickness or firmness of the peritoneal investment, preventing ovi-position.

It is so improbable, *à priori*, that this variety of extra-uterine pregnancy should occur, that very many have positively denied its existence; but, as we have reason to believe, from facts already mentioned, that fecundation may occur in the vesicle of the ovary, the

probability of ovarian pregnancy is less wonderful, while positive cases, adduced by many excellent and practical anatomists and pathologists, seem to leave no doubt of its occasional occurrence.

A case, for example, is reported by Boehmer, who declares that he traced the membranes of the ovary over the sac containing the fœtus. Granville, also, mentions an instance, where the fœtus lived for four months, but the patient survived for ten years and a half, and then died from internal hemorrhage. After death, the hemorrhage was found to have proceeded from the rupture of the enlarged ovarian artery distinctly traced into the cyst, containing the fœtus of four months. The lower part of the cyst was diaphanous, and the rest formed of the tunics of the enlarged

ovary. Dr. J. Hall Davis, of London, also details a case. These, and similar observations, confirm the opinion in the minds of a large majority of accoucheurs, of the existence of this form of pregnancy. M. Velpeau, although he denies the existence of a proper "intra-ovarian" pregnancy, nevertheless admits "of the growth of the germ in a ruptured vesicle, or on the circumference of the gland which produced it." This, certainly, must be regarded as an ovarian pregnancy, as the ovule had not escaped, either into the cavity of the abdomen, or into the Fallopian tubes, but was arrested on, if not in, the ovary.

Tubal Pregnancy.—Few, if any, doubt the existence of this variety of extra-uterine pregnancy. It has not only been frequently observed and accurately demon-

Fig. 109.



Tubal Pregnancy.

strated, but has been artificially produced in animals. Mr. Nuck has allowed, for example, a bitch to be impregnated, and soon after exposed the Fallopian tube, and secured it by a ligature. The animal recovered, and subsequently a tubal pregnancy was found upon the ovarian side of the ligature. The comparative frequency of tubal pregnancy is stated by Velpeau to be as nine to three; Hecker, however, of Germany, reverses the proportion, declaring that in one hundred and ninety-six cases of extra-uterine pregnancy, sixty-four were tubal, and one hundred and thirty-two were ventral and ovarian.

A very interesting preparation, perhaps unique, has been sent to the author by Dr. Craghead, of Danville, Virginia, which was taken from the body of a woman, who, after much suffering with febrile symptoms, was delivered of a small fœtus during the fourth month of utero-gestation, and soon after died. Upon a post-mortem examination, a small placenta was found adhering at the posterior part of the uterus, where it is still to be observed. In the left Fallopian tube, about two inches from the uterus, there is a tumor, whose diameters vary from three to five inches, evidently formed of the parietes of the tube, containing a small

placenta and membranes, and enclosing a fœtus as perfect, as to development and size, as the one thrown off previously from the cavity of the uterus; in other words, it is a case of intra- and extra-uterine pregnancy, contemporaneous and coexistent. A more full account of this interesting case is given in the American Journal of Medical Sciences, January, 1850, p. 114.

The *causes* of tubal pregnancy cannot readily be demonstrated, but may easily be imagined. The experiment of Mr. Nuck, above alluded to, shows that, in

some instances, they depend upon obstruction. This obstruction may arise from spasmodic action of the tubes, from mucoid or lymphatic deposits in the canal, or from a stricture, either congenital or resulting from inflammatory action. The progress of the ovum may also be arrested by imperfect or irregular physiological action of the tubes, not only from spasmodic stricture, but it may be from too great relaxation or inertia in the muscular parietes.

Interstitial Pregnancy, or Pregnancy in Substantia Uteri.—In this variety the ovum is developed between



Interstitial Pregnancy.—a. Uterus. b. Cavity in which the Ovum was developing. c. Ovum with its Placental Vessels.

the mucous and peritoneal coats of the uterus, in its fibro-muscular tissue, without any communication between it and the cavity of the uterus, or that of either of the Fallopian tubes.

A priori, the occurrence of such an accident could not be anticipated; but the investigations of morbid anatomists have fully proved its occasional existence. The first case recorded was in 1801, by Schmidt, of Vienna. M. Breschet, in 1824, published an account of all cases reported up to that time, some thirteen in number; since which about the same number have been recorded by different authors, leaving no doubt that such cases do occur. The cyst has been found complete, containing the fœtus, the membranes and

placenta, often developed to a much greater size than that of the uterus, and yet no communication existing between the cavity of the cyst and that of the uterus. In one remarkable case, mentioned by Mr. Hey, of Leeds, the placenta, however, was said to be in the uterus, and the cord to pass through a small opening into the cyst, containing the fœtus, constituting, therefore, a "utero-interstitial" pregnancy.

The location of the cyst varies, being occasionally near the Fallopian tube, above or below it, and, in other instances, at or near the fundus. It is said to occur more frequently on the left than on the right side, in the proportion of five out of seven.

The causes are enveloped in obscurity; the supposi-

tion of M. Breschet, that the ovule penetrated from the cavity of the uterus, through a venous sinus, into the substance of the uterus, is altogether gratuitous, as also other hypotheses that tubes pass through the ligament of the ovary, or that the Fallopian tube terminates in the substance of the uterus. The most rational supposition is, that some preternatural formation of the uterus existed, or that there was some ulceration or abscess penetrating the mucous membrane at the time of the descent of the ovum, into which this body passed; the opening being subsequently closed by the usual process of contraction and cicatrization.

Abdominal or Peritoneal Pregnancy.—Abdominal pregnancy seems to be so improbable, that many learned accoucheurs have thought it impossible that it could ever exist as an original accident. It was not deemed possible, even if an ovum were deposited in the peritoneum, that it could survive, and be developed; hence, the supposition was made, that ventral pregnancy was always secondary, and never primary, being the result of ulceration or rupture of the uterus, or of some other extra-uterine tumor. Such accidents sometimes occur; but the accumulation of accurate observations proves positively that ventral pregnancy is often primary, the foetus being evidently developed in an unnatural situation, which could not have occurred if it had escaped from the cavity of the uterus, either by ulceration or rupture, for then it must have immediately perished from the contractions of the uterus separating the placenta.

An interesting case, demonstrating the continuance of the life of the foetus, and its growth in the cavity of the peritoneum, occurred, many years ago, in the practice of Dr. Marshall Paul, who called the author to assist him. Mrs. S. supposed herself to be six months advanced in pregnancy, and being very miserable, her physicians were consulted. On examination, the lower part of the abdomen was found tumid, as at the fifth month of utero-gestation; the intestines were somewhat swollen, and the uterine tumor not distinctly recognized; but an irregular projection could be felt under the linea alba. On attempting to pass the finger into the vagina, it was arrested by a large tumor. The vagina ascended up behind the symphysis pubis; above this, with some difficulty, the finger could indistinctly perceive the orifice of the uterus. In pressing firmly on the posterior wall of the vagina, as it descended close to the vulva, the back of a foetus could be traced by means of the spinous processes. On an examination, per rectum, the head of a foetus could be plainly perceived; the sagittal suture and anterior fontanel being readily

recognized. There could be no doubt, therefore, that it was either a case of extra-uterine pregnancy, the child being developed between the vagina and the rectum, or a case similar to the one described by Merri-man, of pregnancy in a retroverted uterus, persisting beyond the fourth month of utero-gestation. Unfortunately the patient died in a short time from a severe attack of cholera morbus. Upon a post-mortem examination, the uterus was found directly under the linea alba, of small size, as usually observed at the second month of pregnancy; and the whole lower part of the abdomen underneath the uterus and behind the vagina was filled with a tumor extending from the left iliac fossa to the right, and rising as high as the fourth lumbar vertebra. On opening this tumor, a very large placental mass, nearly spherical, was found in the left iliac fossa, some three inches in diameter, and not only unnatural as regards its thickness, but also as regards its density. Upon the inner or pelvic surface of this mass was the attachment of an umbilical cord, and from it extended foetal membranes into the cavity of the pelvis, in which was discovered a foetus completely impacted, the back presenting anteriorly, while the nates were directly under the promontory of the sacrum, the head resting upon the rectum, and the limbs of the child closely compressed between its body and the hollow of the sacrum. A very small quantity of fluid was observed in the sac. There was no difficulty in removing the foetus from this unnatural situation, as there were no adhesions whatever between it and the surrounding tissues: but so close was the impaction, that some deformities in the child had been produced, evidently by the pressure. Club-feet and some flattening of their surfaces were found. The right hand was of a diminished size, and very much compressed between the side of the head and the shoulder. At this spot the degree of pressure was so great that a portion of the scalp, covered with hair, projected over the hand and upon the shoulder. It was of a triangular shape, about an inch and a half in length, resembling the ear of a dog. In addition, in the right groin, and parallel to its length, was an ulceration of the skin, about an inch in length, and a quarter of an inch in breadth. The size and development were those of a child of five and a half or six months of pregnancy; and, with the exceptions above-mentioned, the foetus was perfect in its external appearance.

These facts are altogether inconsistent with the supposition of a primary uterine gestation. The ovum must have originally been deposited in the peritoneum, and the child been developed out of the uterus, as the deformities mentioned were evidently the result of the pressure to which it was subjected in its confined posi-

tion in the hollow of the sacrum, and underneath the promontory. This was further confirmed on the first examination by auscultation in the hypogastric region of the mother, where a distinct placental murmur could be perceived. It is a matter of regret that a metro-scope was not employed to ascertain the pulsations of the heart through the posterior walls of the vagina.

Velpéau and other authors cite analogous cases, in which not only auscultation, but also the motions of the fœtus indicated its vitality, sometimes for several months, where the event proved that the pregnancy was ventral, and doubtless primitive. It seems impossible to suppose that the fœtus could remain alive if it had been originally developed in the uterus, or in any of its appendages, and escaped—in consequence of a rupture—into the cavity of the abdomen. It is well known also that such accidents, with few exceptions, are speedily fatal; while ventral pregnancies are by no means infrequent. Hecker, of Vienna, maintained that they occurred one hundred and thirty-two times out of one hundred and ninety-six extra-uterine pregnancies.

Moreover, the location of the placenta, its irregular form and developments, its very close adhesions to the peritoneum, conjoined with the absence of any phenomena during life, or any evidence after death, of the rupture having occurred, confirm, we think, the fact, that in many instances, ventral pregnancy is primitive, and not always secondary. This opinion is generally received, although it has been opposed by such authorities as Merriman, Blundell, Campbell, Churchill, etc.

The causes of abdominal pregnancy must also be hypothetical, but it can be easily imagined that after impregnation of the vesicle, the ovule may fall into the peritoneum in consequence of a sudden suspension of the erection of the Fallopian tubes, or from their imperfect or incomplete erection; or, there may be some malformation, natural or acquired, of the fimbriated extremity; or the ovule, even after reaching the tube, may, by some reverse action, recede into the abdominal cavity.

Such are the varieties of extra-uterine pregnancy. It is most wonderful that the ovule can survive and be developed exterior to the proper organ of gestation; but, as the embryo and its membranes have an independent existence, facts prove that, in many instances, attachments by the shaggy surface of the chorion may be effected to any of the living tissues of the mother with which it may be in contact, sufficiently strong and efficient, not merely to maintain the life of the ovum, but to afford sufficient materials for the nourishment and development of the ovum and

the embryo, even to the usual period of uterine gestation. All this is abundantly confirmed by post-mortem examinations, which demonstrate an increased vascularity of the membranes of the cyst, and a great enlargement of the supplying vessels, particularly to that part where the placenta is attached; and that the vascularity is proportioned to the developments of the fœtus. Hence, when from accidents, ulcerations, etc., the original cyst of the fœtus is ruptured, the hemorrhage is profuse, and often fatal. The fœtus may survive for nine months, or according to some, even for a longer time; but more frequently it perishes toward the fourth or fifth month, especially if it had been lodged in the substance of the uterus, or in the tubes.

Progress and Termination.—The ovum, in maintaining its vitality, of course has not merely its own envelopes, the amnion and chorion, but also adventitious coverings, varying according to the original location of the ovule. In ovarian pregnancy, for example, we have an envelope of the peritoneum covering the ovary, and if there be much irritation, adhesions ensue to the surrounding tissues, giving more or less density to all the walls surrounding the liquor amnii and embryo. In tubal pregnancy, we have, in addition to the proper membranes of the ovum, those of the Fallopian tubes, which become very much developed and enlarged, simulating the growth of the uterus; sometimes they are also strengthened by adhesions to the peritoneum. When interstitial pregnancy exists, the inner and the outer tissues of the uterus cover the chorion. In abdominal pregnancies the adventitious envelopes of the ovum arise entirely from adhesions of the chorion to the abdominal peritoneum; the intestines and surrounding tissues become agglutinated to the sac, so as to form one irregular swelling, gradually increasing in size during the life of the fœtus.

As already remarked, notwithstanding these unnatural locations, the embryo is developed with almost the same rapidity as in regular or natural pregnancy, even perhaps to the ninth month; its life, however, is very uncertain, and often very short; indeed, it is quite justifiable to imagine that many ova perish, soon after impregnation, from falling into the cavity of the abdomen, or from being arrested in the Fallopian tubes. This occurring immediately after conception, and adhesions not ensuing, the embryo soon perishes from the want of nourishment; but no bad consequences follow, as the minute ovule produces no irritation. If, however, vital connections be made with the surrounding tissues, it continues to grow for a longer or shorter period; in some cases it perishes early, and then the excitement or irritation diminishes, and the embryo

may remain encysted in its own membranes, not only for days and months, but for many years. No atmospheric air being present, there is no putrefaction, and of course no proper decomposition of the fœtus; but some chemical changes occur in its tissues, analogous to what is observed in old alcoholic preparations, or resembling more the sebaceous or adipoceros degenerations which are found in old cemeteries.

In other cases, so much irritation and so rapid a development of the ovum occur, that, owing to inflammation or ulceration in the surrounding tissues, or some sudden motion, straining effort, or accident, a rupture of the cyst ensues, in consequence of which the embryo escapes into the peritoneal cavity, necessarily perishing. Very frequently the mother also perishes, in consequence of the severity of the hemorrhage, which is necessarily internal and occult. Should she survive the hemorrhage, she may die in consequence of acute peritonitis supervening upon this accident. If, however, the inflammation be moderate, and the woman strong, the inflammation and febrile symptoms may disappear, and the patient recover; the fœtus becoming again encysted among the intestines by adventitious membranes, the result of inflammatory action, and then can be carried for years with impunity. During this time the mother often does well, enjoying excellent health, and, in some few instances, becoming again pregnant, and carrying her infant in utero, which may be born alive at the full period of utero-gestation.

Although a woman may live, carrying an encysted fœtus, for many years, yet discomfort often exists from its pressure or weight, and sometimes so much irritation is produced, as gradually to undermine her strength; but in all cases, whether enjoying excellent health, or passing the life of an invalid, she is liable, from accidental causes, to inflammation ensuing in the walls of the cyst. Occasionally such inflammation may be "resolved," but not unfrequently suppuration occurs, and abscesses form, which are followed by ulcerations, penetrating the surrounding tissues. Abscesses of this kind have been known to open at the umbilicus, at the crural or inguinal rings, or other portions of the surface of the abdomen; perhaps more frequently they open into the small or large intestines, often into the rectum, or into the vagina, or even into the bladder. Then atmospheric air finds admission into the cyst, whence decomposition of the fœtus ensues, aggravating immensely the sufferings and dangers of the unfortunate woman. The putrefying effluvia, the absorption of putrescent matters, as well as the great quantity of the discharges, alike combine to prostrate the powers of the system to a fatal degree, probably

in all cases, where the opening is not so near the surfaces or the orifices of the body as to allow of surgical assistance. But when the opening is dependent, so as to favor a ready outlet of the fluid, and where the practitioner can assist the natural operations, in facilitating the removal of the remnants of the fœtus, patients may and often do recover; the cyst collapses after its contents have been completely discharged or absorbed, and eventually becomes obliterated, so that the patient is restored to her usual health and avocations.

The terminations of extra-uterine pregnancy are, therefore,

First. The death of the fœtus and its becoming encysted in its own membranes.

Second. The rupture of the sac, the death of the fœtus, and usually the death of the mother from hemorrhage or inflammation.

Third. The encysting of the fœtus in the cavity of the abdomen, after escaping from its original location.

Fourth. The occurrence of inflammation and abscesses, destroying the life of the patient, either directly from the violence of the symptoms, or indirectly from the continuance, quantity, and putrescency of the discharges.

Fifth. The recovery of the patient from the emptying of the abscess, its obliteration, and, of course, the subsidence of all irritation.

Of these terminations, the first, where the embryo perishes early, and is encysted in its own membranes, is by far the most favorable, as the tumor is small, and very little irritation is produced; nevertheless, in primitive ventral pregnancies, where the child has survived for several months, the mother may suffer comparatively little, and the fœtus dying, she may live for years. Mr. Campbell reports cases of this kind remaining even fifty, and, in one case, fifty-six years.

In tubal or in interstitial pregnancies, few patients survive, unless, fortunately, the embryo perishes very early; otherwise, there seems to be a limit to the development of the fibres of the tube, or those of the uterus, so that generally at the third, fourth, or fifth month rupture occurs, and the patient may perish from hemorrhage, or from subsequent inflammation. M. Hecker has shown that the fatality in tubal and interstitial pregnancies is sixty-three to one, or about ninety-eight and a half per cent.; while, in primitive ventral or abdominal pregnancies, the fatality is fifty-six to seventy-six, or nearly forty-two and a half per cent. These last probably include ovarian as well as peritoneal pregnancies; and also those cases where the patient recovered after the formation of abscesses, as

well as those where the fetus was encysted in its own membranes, or, by the inflammatory process, after rupture of the original sac.

By post-mortem examinations it is discovered that, in extra-uterine pregnancies, for one or two months, the uterus usually enlarges, its tissues become softened, as in normal gestation, the mucous membrane hypertrophied, and there is, also, a formation, very generally, of a membrana decidua, and occasionally a gelatinous secretion occurs from the glands of Naboth, occupying the cervix uteri.

The fetus is found in various conditions, perhaps most frequently maintaining its form, but converted into a kind of sebaceous or adipoceros (gras des cadavres) matter; in a few instances, it is covered with a calcareous deposit, or is perfectly solidified, a "lithopædion." Sometimes it is said to be "mummified," or exsiccated, all the fluid matters in the cyst and in its own tissues having been absorbed. Of course, no putrefaction can occur, as no atmospheric air is present; where, however, an abscess has opened, externally or internally, through any of the mucous membranes, air being admitted, decomposition rapidly ensues, the fetus becomes disintegrated, portions of it escape, and, should the patient survive, the whole may be discharged, followed by the sloughing of the placenta, the contraction and obliteration of the cyst.

In some rare cases, where the opening has been into the bladder, the remnants of the fetus, which may have penetrated this viscus, have become the nucleus for calcareous deposits from the urine; thus superadding to the original symptoms and dangers of extra-uterine pregnancy those of calculus vesicæ.

Very universally, the proper membranes of the ovum are found, although, in some old cases, they have disappeared by absorption; the placenta always exists, generally, however, of a diminutive size. In some cases, it is thicker and more firm than in normal instances. This was remarkably true in the case of Dr. Paul, already mentioned, where the placenta was fully three inches in thickness.

The placenta, let it be remembered, is always closely adherent, and cannot be detached as in natural gestation; the liquor amnii is usually small in quantity, sometimes entirely absent; and, in a very few instances, it is redundant, and its character abnormal. Velpeau quotes a case from Vassal, where a vast quantity of water was collected, a true hydrops ovi.

Diagnosis.—The diagnosis of these unfortunate accidents is necessarily very obscure. Nothing can be positively known, until after four or five months, when the fetus has obtained considerable size, and a tumor may be felt by an internal or external examination. Even

in such cases, a differential diagnosis is very difficult, as extra-uterine pregnancy may be mistaken even for natural pregnancy, and more frequently for tumors of the ovaries, uterus, mesenteric glands, etc., or for feculent accumulations, or enlarged kidneys; sometimes also for encysted or other varieties of dropsy, or for accumulations of gelatinous or fatty matters in the walls or cavity of the abdomen.

This differential diagnosis respecting tumors of the abdomen, has, indeed, intrinsic difficulties. The experience of every practitioner, and the history of medicine, present the record of great mistakes. Heim and Dieffenbach, of Berlin, with other eminent physicians, countenanced the operation of gastrotomy for supposed extra-uterine pregnancy, and yet on opening the cavity of the abdomen, no preternatural tumor of any kind was discovered. Gastrotomy has been employed for ovarian tumors mistaken for uterine tumors, and has sometimes been resorted to where the viscera of the abdomen were perfectly healthy, no new formation existing. Errors in diagnosis in cases of ascites, normal pregnancy, preternatural growths, etc., have often been made, even by the most experienced physicians, when exercising the greatest care and attention.

Symptoms.—Occasionally, some of the usual symptoms of pregnancy exist: the catamenia may be suspended entirely, but more frequently they disappear only for two or three periods, and afterward return irregularly; the mammae with their papillæ and areolæ imperfectly and irregularly sympathize with the pelvic disturbances. Sometimes no change whatever occurs in these tissues; while in other cases the developments are very similar to those of true pregnancy, so that even milk is secreted. Cazeaux refers to a remarkable instance where the menses were suppressed, and lactation continued for thirty years. As regards the uterus during the first two months, some changes may be observed by examination per vaginam, as the organ enlarges for a short time. There is, however, very little development or alteration in the cervix uteri, similar to those which occur in pregnancy. Subsequently no regular uterine tumor can be discovered in the hypogastrium, though occasionally the uterus, slightly enlarged, is so elevated, that its outlines can be felt through the walls of the abdomen, if the patient be not corpulent.

The motions of the fetus are indistinct, and sometimes imperceptible, but in other instances they are perceived earlier than usual, and often felt more distinctly by the patient or by a hand externally, owing to the superficial location of the fetus. In such cases, the diagnosis can occasionally be established by tracing the form of the child, especially if felt in an unnatural

position, as in the iliac fossa or low down in the pelvis; while the uterus may be detected pushed out of its natural position. The diagnosis may sometimes be confirmed by auscultation, recognizing the sounds of the heart or placenta, one or both. In some instances, there is also an irregular form of the abdomen, recognizable, if not by the eye, at least by the hand. The sympathetic or rational signs of pregnancy are equally uncertain, like the sensible signs being irregular or sometimes entirely wanting, forming therefore no positive indication of the real nature of the case.

Therefore, although in some instances, after the fourth or fifth month of gestation, a positive diagnosis can be made, yet generally the whole subject may remain in doubt, even for many years, until subsequent developments, or even post-mortem examinations, eventually reveal the true nature of the case. Occasionally, however, at some period before the usual termination of natural pregnancy, symptoms of labor supervene, lasting for hours or even days, and simulating the regular contractions of the uterus, but then gradually disappearing, and seldom accompanied by any discharges from the vagina. In other cases, discharges, serous or sanguineous, have occurred; the size of the patient not, however, being diminished, although her health may be restored, and the catamenia be regularly established.

These symptoms of labor perhaps most frequently occur at the ninth month; sometimes, however, at the death of the infant, even in the earlier months; sometimes they recur frequently, the patient often considering herself in labor. The explanation of this phenomenon is difficult, the foetus not being in utero. When it is lodged in the substance of the uterus or in the tubes, we might possibly anticipate some irregular contraction of the muscular fibres; but such a supposition cannot well be entertained, when the foetus is deposited in the ovary or in the cavity of the peritoneum. It is barely possible that such pains are the result of uterine contractions induced by the presence of a membrana decidua, or of blood in the cavity of the uterus.

Treatment.—The treatment of extra-uterine pregnancy must be palliative, especially as the diagnosis is so often obscure and impracticable. The practitioner should bear in mind the possibility of such extraordinary cases whenever consulted respecting pelvic and abdominal disorders in married women. While attempting to comfort and relieve his patient, he should be very careful of any decided and heroic treatment, even when he may have satisfied himself as to the nature of the case, as it is seldom but that some doubt may still exist; for even the most experienced and judicious men have differed as to the nature of

the complaint after careful examination of the same patient.

Respecting the symptoms of labor, they should be moderated or relieved by the free exhibition of anodynes, occasionally preceded by venesection, as such pains cannot accomplish delivery, and are therefore decidedly injurious to the patient's general health, and may possibly, in some cases, favor the rupture of the cyst.

Although, therefore, the general treatment of extra-uterine pregnancy is essentially palliative, yet two or three important questions sometimes call for a decisive answer; as,

First. Is the operation of gastrotomy ever advisable? Certainly it is not justifiable in the early stages, as the diagnosis cannot then be sufficiently established. Subsequently, when the existence of a foetus, and especially of a living foetus, can be distinctly recognized, the question assumes a more practical importance, although, in the present state of our knowledge, its solution remains difficult. The objections are very decided; a large cavity has to be opened, the parietes of which are generally very vascular; the child cannot always be easily removed, as it is sometimes found to be adherent, and in all cases the placenta cannot be removed. Hence, there must be a great deal of inflammation and suppuration, with putrefying discharges, often continuing for a long time, so that the patient—if she does not perish speedily from hemorrhage or inflammation—may be exhausted by pain, hectic fever, and its miserable concomitants.

Professional experience as to this operation is necessarily limited, but may be regarded as decidedly adverse to its propriety. Cases, indeed, are quoted from Lauerjat, Delisle, Müller, and others, where mother and child were both saved. Burns mentions three cases where the children lived, but the mothers perished. Velpeau also quotes from several authors cases where the mother occasionally survived, but very generally the foetus perished; while Campbell states that of nine cases in which the operation was performed during the life of the foetus, or immediately after its death, all the mothers perished, and that in two instances the child survived. In many cases where the child was said to have survived, it nevertheless perished soon after birth, so that there are very few authenticated cases in which any permanent benefit, so far as the child is concerned, resulted from gastrotomy; while in most instances the mother perished, either from hemorrhage or from subsequent acute or chronic inflammation. Hence, as the child's life, under these circumstances, says Cazeaux, ought not to be taken into consideration, the danger to the mother is so

great, that the operation is not justifiable except in some extraordinary cases. Let it be observed, also, that the greatest success was obtained where the incisions were made through the walls of the vagina; the abdominal operation being far less successful.

If it should be performed, the suggestion of Mr. Graves deserves consideration. He recommends to make an external incision to a considerable depth, but to avoid perforating the cavity of the peritoneum or the cyst; then to wait for some ten days, under the hope that the adhesive inflammation may be so extensive that when the sac is opened, the peritoneal membrane will not be involved, and that therefore there will be less danger of peritonitis.

There is reason to believe that, in a large number of cases, the operation for an extra-uterine foetus will differ materially from the ordinary operation of gastrotomy, or of gastrohysterotomy, inasmuch as very universally the cyst is so closely adherent to the surrounding tissues, that it may be punctured or incised without opening the peritoneal cavity, which greatly diminishes the dangers.

These dangers may be still further diminished if the practitioner be careful to remove, as speedily as possible, all portions of the foetus, even if the incisions should necessarily be of small size. This can be readily done by means of scissors, forceps, crotchets, etc. The advantage will be great, by removing most of the sources of putrefaction, and facilitating the rapid diminution of the cyst. No attempt should be made to detach the placenta, as it is adherent, and must be left, therefore, to the sloughing process. Repeated simple injections into the cyst will wash away the results of putrescency, and thus increase the chances of the patient's recovery.

The objections to gastrotomy, great as they are in themselves, are much enhanced by the fact that, after the death of the foetus, the symptoms of irritation often diminish, and entirely disappear, so that the woman may recover her health, and survive for ten, twenty, or thirty years. Hence, although a few patients may have been apparently saved through gastrotomy, yet there is strong reason for the belief that the probabilities for recovery are far greater when no operation is performed.

In view of the above facts, it has been suggested to adopt measures, as early as possible, to destroy the life of the foetus in extra-uterine pregnancies, and thus to escape the accumulative dangers from rupture, hemorrhage, or inflammation consequent upon its continued development. The morality of this practice need not be defended, as it may be assumed that the child must, sooner or later, perish.

Two propositions for this purpose have been made: the

First is, to resort freely to bleeding and abstemious diet, purging, etc., so as to diminish the organic actions of the mother, under the hope that the child may perish from deficient nourishment. There can be no hesitation in affirming that such practice will be futile as respects the infant, and most dangerous as regards the mother.

The second suggestion is far more feasible. It was made in 1857, by M. Bachetti, of Pisa, and consists in destroying the life of the foetus by means of an "electro-puncture." He states that he actually succeeded in carrying out his suggestion successfully by inserting two needles into the sac, and directing through them an electro-magnetic current.

Should the diagnosis therefore be well established, we perceive no practical objection to this operation, which may prove of great importance in suitable cases.

Second. Another practical question may also be agitated. Should gastrotomy be performed in those cases where rupture of the cyst has occurred, and the patient's life is in danger from hemorrhage or subsequent inflammation? The theoretical objections to operating immediately are overwhelming: as, for example, the great prostration of the patient, the necessity for opening the peritoneal cavity, the impossibility of removing the cyst or the placenta, or even the blood and fluids which have been effused in consequence of the rupture, the admission of atmospheric air, and the putrescency which would result from the placenta, coagulated blood, etc. Few practitioners have ventured upon the experiment, although Velpeau countenances the idea that, if the child be still living, the operation is justifiable. Cazeaux, however, condemns the operation under these circumstances, and would postpone it indefinitely,—at any rate, until the child was again encysted, and all symptoms of inflammation had subsided.

We know of no facts which can justify gastrotomy under these circumstances, unless it be those operations which have been occasionally performed with success for the removal of the foetus and placenta from the cavity of the abdomen after rupture of the uterus. The cases, certainly, are very analogous.

Third. Still, a third question requires attention. Should gastrotomy be employed where the foetus is dead and encysted either primarily or secondarily? The general answer to be made, without hesitation, is in the negative, for the local symptoms of irritation, under these circumstances, very often cease, and the mother may survive, and enjoy excellent health for years. She ought not, therefore, to be exposed to the risk of an operation.

To this general rule, however, there may be exceptions. Cazcaux and Dezeimeris, for example, advise that if much pain—especially simulating “labor pains”—be persistent, and the general health of the patient be seriously affected, gastrotomy would be justifiable as a dernier resource, other measures failing to afford relief. It may be noted that, in such cases, there will be less danger from hemorrhage, as, the child and the placenta being dead, there will be a great diminution in the vascularity of the tissues, and especially in the size of the supplying arteries.

Again, if the practitioner be called after inflammation and suppuration have been established, and a “pointing” of the abscess can be recognized toward the external cutaneous or any of the internal mucous tissues, it will be often advisable to make an incision immediately, without waiting for the process of ulceration, for the evacuation of the confined fluids, so as rapidly to diminish the tension of the tissues and the sufferings of the patient. If practicable without opening the peritoneal cavity, such incisions into the sac should be large, so as to allow of the speedy removal of the foetus, which, after the admission of atmospheric air, would soon putrefy. — If such large incisions be not practicable, it may sometimes be advisable, at first, to evacuate the fluid, either by a small incision or by means of a trocar and canula, and subsequently to enlarge the opening so as to remove the foetus. Ramsbotham relates an interesting case in which this method was adopted with eventual success to the mother.

In other instances, Graves’ method, already alluded to, might be preferable.

An instructive case occurred to M. Dubois. He had resolved upon gastrotomy per vaginam for an extra-uterine foetus in the pelvis. The posterior wall of the vagina was divided, but the immediate removal of the foetus could not be accomplished, owing to adhesions—which are very unusual—between the child and the walls of the cyst. The patient was remanded to her bed, suppuration ensued, the foetus and its appendages were gradually discharged, and the patient recovered.

Again, it not unfrequently happens that an opening has been made by ulceration, and the liquor amnii and pus have been discharged before the patient has submitted to medical treatment. Generally, under these circumstances, putrefaction of the foetus, etc., has commenced, and the patient is rapidly declining from pain and irritation, as well as from the effluvia and absorption of putrescent matters. The indication is now clear. The remains of the foetus should be removed at once by carefully enlarging, if necessary, the opening, or, if this be not prudent, by breaking down the foetus

with scissors and forceps, so that the whole cyst can be completely emptied. This being accomplished, the prospect of a recovery is very great, notwithstanding the presence of the sloughing placenta. Mr. Campbell, for example, has collected some forty-two cases, of whom thirty-eight recovered. There are, however, unfortunate cases, where little expectation can be entertained for the patient’s safety. The opening, sometimes, occurs into the bladder, involving the necessity of opening this viscus, either from the vagina, which is preferable, or from above the pubis; while, in other instances, the opening takes place into the colon, or small intestines, where it cannot possibly be reached; very generally, in such cases, the patient must perish. Perhaps, in some cases, it might be justifiable to make a counter-opening through the parietes of the abdomen into the cyst for the removal of its contents.

The author has met with three instances of extra-uterine gestation: one has been already alluded to, where a foetus was developed for six months in the pelvis, the mother perishing from an acute attack of cholera morbus. The second was observed in consultation with the late Dr. Yardley, who was called to a woman, whose health had been wretched for one year, in consequence of constant diarrhoea, very generally of an offensive and putrid character. On examination per vaginam, a swelling was detected behind the posterior wall of the vagina, which was directed upward behind the symphysis pubis. On an examination per rectum, bones were discovered in this canal. The author, being sent for, removed, without difficulty, some of the bones of the extremities of a foetus. It was then found that, about two and a half inches from the anus, there was an opening, an inch in diameter, through the anterior walls of the rectum, into a cyst, still occupied by a large number of bones. In the course of a few days, these were all removed. The soft parts of the tissues were destroyed by putrefaction. The patient now gradually recovered; the discharges daily diminishing, and the cyst contracting, until it was completely obliterated, so that the woman regained her strength, and resumed her laborious avocation as a washer-woman. The short history, which could be obtained, was that, ten years previously, she regarded herself as pregnant; the symptoms, however, eventually disappearing, she resumed her usual employment. Some three years afterward, she again became pregnant, and was delivered, at the full period, of a dead child by Dr. Noble, with the assistance of forceps; on recovery from this labor, she again enjoyed good health until the year previous to Dr. Yardley being consulted, when, from some unknown cause, inflammation of a moderate character occurred in the cyst, with the results already

detailed. There is reason to believe that all the soft tissues of the child and even the placenta, with some of the bones, had been discharged through the fistulous opening into the rectum, prior to any professional investigation of her case. This is confirmed by the fact, that the bones, now in the author's possession, were perfectly denuded of their membranes; the larger bones, which were perfect, indicated a fœtus of six months of gestation, but their number was, by no means, complete.

Another interesting case was committed to the author's care from Steubenville, Ohio, of a lady, who considered herself at the full period of utero-gestation at the beginning of August, when symptoms of labor occurred, so decided that her accoucheur remained near her during the whole night. From this time she became a perfect invalid, and emaciated considerably, without, however, much suffering, but with occasional paroxysms of hectic fever. In this condition, she visited Philadelphia, during the following month of May, nine months after her supposed labor. She was excessively emaciated, with a tumid, tympanitic abdomen, and as large as most females at seven months of gestation. No accurate diagnosis of a tumor could be

made, although percussion indicated more solidity at the lower than the upper part of the cavity. Unfortunately, soon after her arrival, owing to jolting in a carriage, considerable pain was produced, followed by a severe diarrhœa; the discharges were so horribly offensive as to affect the whole house, rendering most of the inmates sick. On examination per vaginam, this passage was found elongated, the os uteri being high up; in the rectum was detected the os femoris and one os maxillare superius, quite denuded and perfect in their form, as if belonging to a fœtus of nine months; these were removed, but no opening into any cyst or cavity could possibly be detected, and, as far as was observed, there was no subsequent discharge of bone. In a few weeks the putrescent evacuations ceased, and the patient so far recovered as to return to her home at Steubenville, and survived until the month of March following, when she died from exhaustion. A post-mortem examination revealed a cyst in front of the lumbar vertebræ, still containing some remains of a fœtus, and with an opening into the sigmoid flexure of the colon. The unfortunate location of this opening rendered any surgical assistance impracticable, as it could not have been detected during life.

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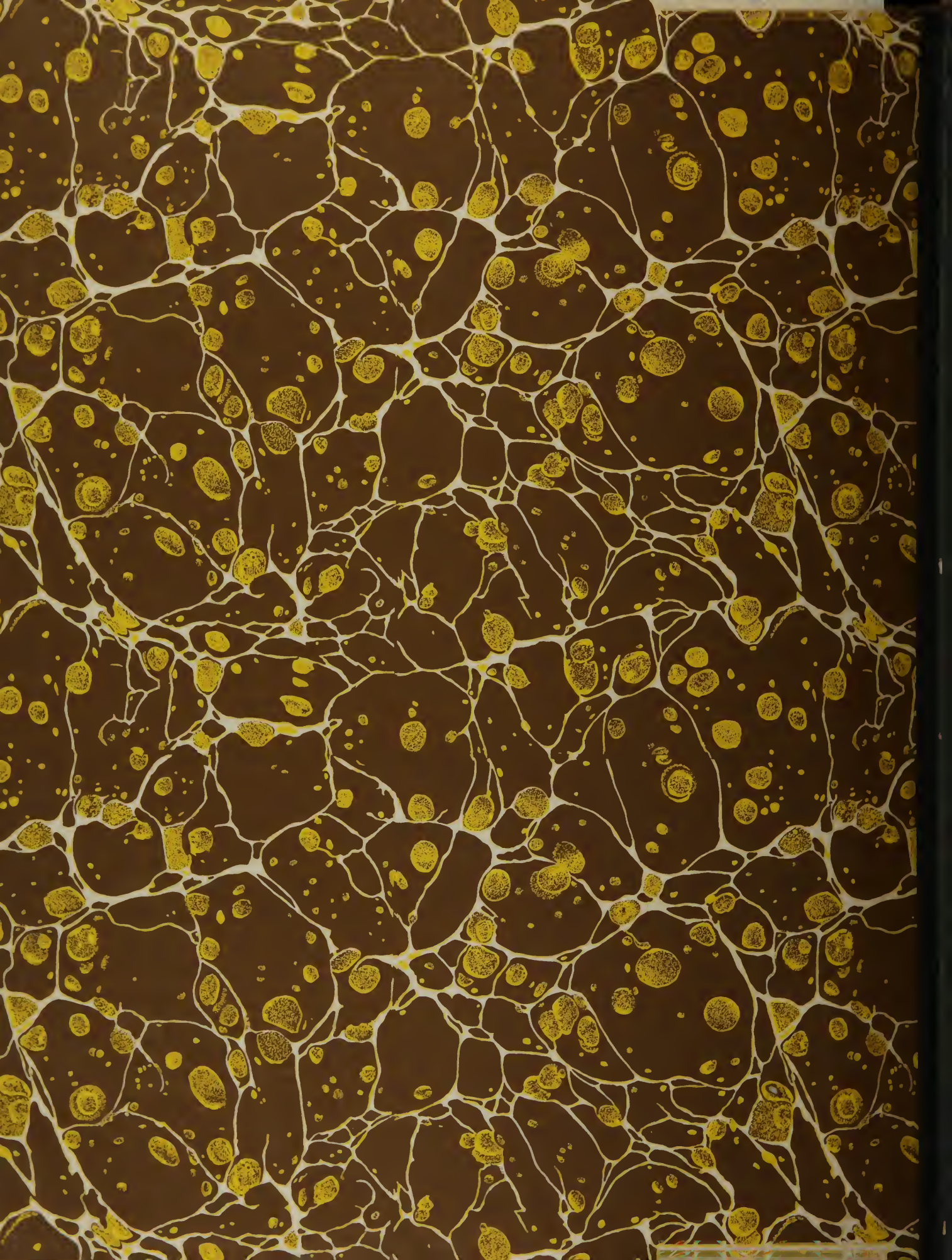
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